Guideline for Performing Air Quality Impact Analyses

Stationary Source Program
AQ Division

State of Idaho
Department of Environmental Quality
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Abbreviations, Acronyms, and Symbols

DEQ	Idaho Department of Environmental Quality
EPA	US Environmental Protection Agency
Acfm	actual cubic feet per minute
AERMIC	American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement
AQCR	air quality control region
AQRV	air quality related value
BPIP	Building Profile Input Program
Btu	British thermal unit
CO	carbon monoxide
DEM	digital elevation model
DEQ	Department of Environmental Quality
EL	screening emission level
EPA	Environmental Protection Agency
FEC	facility emission cap
ft	feet
GEP	good engineering practice
H_2S	hydrogen sulfide
IBR	incorporate by reference
IDAPA	A numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act.
ISCST3	Industrial Source Complex, Short Term Ver. 3; a refined air pollution model
K	Kelvin
lb/hr	pounds per hour
m	meter
m/sec	meters per second
mg/m^3	milligrams per cubic meter
mrem/yr	millirem per year
NAA	nonattainment area
NAAQS	National Ambient Air Quality Standards
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen

NWS	National Weather Service
Pb	lead
$PM_{2.5}$	Particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10}	Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
PSD	prevention of significant deterioration
PTC	permit to construct
SCREEN3	An air pollution model used to establish the general distance to the maximum concentration from the facility
SIL	significant impact level
SIP	state implementation plan
SO_2	sulfur dioxide
TAP	toxic air pollutant
T/yr	tons per year
URF	unit risk factor
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VOC	volatile organic compounds
F	Degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter

1 Introduction

1.1 Overview

This guideline is intended to assist air permit applicants, air quality specialists, and others who are reasonably proficient at performing atmospheric dispersion modeling analyses, in understanding the Idaho Department of Environmental Quality's (DEQ's) expectations for performing ambient air quality impact analyses associated with air quality permitting. This guideline does not have the force and effect of a rule and is not intended to supersede statutory or regulatory requirements or recommendations of the state of Idaho or the Environmental Protection Agency (EPA). It is provided as general guidance and does not alter the discretionary authority of DEQ to protect public health.

A working-level knowledge of air pollutant dispersion and air quality assessment is needed to understand and use this guideline. Applicants not proficient in atmospheric dispersion modeling are encouraged to use environmental consultants specializing in air quality modeling or other sufficiently experienced professionals having such modeling capabilities. DEQ does not have available resources to educate applicants or consultants in the fundamentals of performing atmospheric pollutant dispersion modeling analyses.

DEQ staff will not recommend a specific consultant; however, DEQ may provide a list of consultants used by applicants for recent permit applications for which dispersion modeling was required. Recent permit applications, DEQ-issued permits, and the Statement of Basis for issued permits are available on DEQ's website, and consultants used by specific applicants are often identified in application materials and the DEQ modeling memorandum (the modeling review memorandum is typically included as an appendix to the Statement of Basis). DEQ may perform the atmospheric dispersion modeling analyses for applicants in some circumstances. Section 1.2 of this guideline describes cases in which DEQ may perform the analyses.

Table 1 provides a basic step-by-step description of an air quality impact analysis, with specific sections of this guideline referenced for each step.

The purpose of an air quality impact analysis, performed in support of an air quality permit application, is to demonstrate that all applicable ambient air quality standards will be met if a proposed project is implemented or to demonstrate an existing facility's compliance with the standards.

Demonstration of compliance with the National Ambient Air Quality Standards (NAAQS), toxic air pollutant (TAP) increments, and prevention of significant deterioration (PSD) increments is required by the state of Idaho for permit issuance and certain exemptions. DEQ has determined this demonstration generally requires the applicant to perform air quality impact analyses using an atmospheric dispersion model, referred to as modeling analyses in this guideline.

The extent of the required modeling analyses will vary from one project to another depending on the type and magnitude of emissions and applicability of specific permitting requirements. For simple facilities (e.g., few sources and buildings), compliance may be shown by using screening- level techniques, including a screening-level model. No further analyses will be required if compliance can be adequately demonstrated with the use of an appropriate screening technique. Projects for which compliance cannot be demonstrated using screening techniques must use more refined methods. Complex multi-point emitting sources or sources with unusual pollutant dispersion environments, for which screening techniques are not appropriate, are also required to use more refined modeling techniques. Facilities submitting applications for which the PSD requirements are applicable are required to perform more extensive analyses than when submitting a minor source application. This guideline focuses on the requirements for non-PSD applications. Facilities submitting a PSD application should refer to the New Source Review Workshop Manual (EPA 1990) and other available materials from EPA for additional guidance and should consult with DEQ before performing the required analyses.

This guideline follows the Rules for the Control of Air Pollution in Idaho (IDAPA 58.01.01 {Idaho Air Rules}), EPA guidance in the New Source Review Workshop Manual (EPA 1990), and the Guideline on Air Quality Models (EPA 2005). The 2005 version of the Guideline on Air Quality Models was used to develop this version of the guideline. However, the most current version of the Guideline on Air Quality Models should always be used when evaluating appropriate methods and data for a specific project.

The Guideline on Air Quality Models specifies:

"…air quality modeling techniques that should be applied to State Implementation Plan (SIP) revisions for existing sources and to new source reviews (NSR), including prevention of significant deterioration (PSD). Applicable only to criteria pollutants, it is intended for use by EPA Regional Offices, in judging the adequacy of modeling analyses performed by EPA, State and local agencies and by industry. The guidance is appropriate for use by other Federal agencies and by State agencies with air quality and land management responsibilities."

DEQ highly recommends that a modeling protocol be developed and submitted to DEQ for approval before performing any modeling analyses. A DEQ-approved protocol will help assure that methods and data used in the modeling analyses are appropriate and will be acceptable to DEQ reviewers. Guidance on the contents of a protocol is provided in Section 6.1.

Table 1. Sections of the Guideline Used in Performing an Air Impact Analysis

Step in Air Impact Analysis	Section
1) Determine whether professional assistance is needed for performance of the air impact analyses?	1.1, 1.2, 2.0
2) Review general modeling requirements and develop a methodology.	5.0, 6.0
3) Calculate the emissions increase for modeling applicability purposes.	3.3, 6.3
4) Determine whether dispersion modeling is required – compare applicability inventory to modeling thresholds.	3.1, 3.2
5) Select the appropriate model.	6.2, 5.0
6) Set up the modeling analysis, including facility layout, buildings, ambient air boundary, receptors, and elevation data.	6.4.3, 6.4.4, 6.4.5, 6.5, 6.6, 6.7, 6.9
7) Select meteorological data.	6.8
8) Determine background concentrations.	6.10
9) Prepare and submit protocol, and obtain DEQ approval.	6.1
10) Calculate emissions for significant impact analyses and TAPs analyses.	5.1.1, 6.3, 6.3.1, 6.3.2, 6.3.3, 6.4.1
11) Calculate/obtain emissions release parameters and document.	6.4.2
12) Evaluate model results for significant impact analyses and TAPs analyses.	4.1, 4.2, 4.3, 6.11
13) Calculate emissions for cumulative NAAQS analyses and document.	5.1.2, 6.3.1, 6.3.2, 6.3.3, 6.4.1
14) Evaluate model results for cumulative NAAQS analyses.	4.1, 6.11.1
15) Perform comprehensive quality assurance/control of the analyses and evaluation of results.	2.0, 6.11.2
16) Prepare permit application and modeling report.	6.12, 7.0

1.2 Responsibility for Modeling Analyses

The accuracy and representativeness of methods and data used in the modeling analyses is the responsibility of the applicant. DEQ may provide applicants with appropriate meteorological data (not always preprocessed and ready for model input) and default background pollutant concentration values, as described later in this guideline.

DEQ modeling staff may assist applicants or may perform the required modeling analyses in some instances. The following are cases in which DEQ may perform the modeling analyses for permit applicants:

- Renewal of a Tier II operating permit. If a facility has not been modified since issuance of a previous Tier II operating permit, DEQ may use the previously performed modeling results to demonstrate compliance with NAAQS. Previously conducted modeling analyses will not be acceptable if DEQ identifies errors in methods or data used, or if the model used is substantially outdated, such that compliance with NAAQS may be questionable. Changes in applicable standards would also trigger the need to remodel the facility.
- DEQ has current modeling files for the facility. In instances where DEQ has a current model for the facility, slight changes to account for a new source or modification can sometimes be easily made by DEQ modeling staff. The applicant will be responsible for providing, justifying, and

documenting all input parameters needed to adequately address the proposed changes. Modeling analyses performed by DEQ staff will be done outside of the regulatory time limit for permit application review and will be dependent on DEQ staff workload. The applicant must include justification and documentation of all parameters, even those provided in previously submitted analyses. DEQ's permitting process requires that each application be a complete package in itself and not merely reference previously submitted applications.
If compliance with standards cannot be easily demonstrated by DEQ's analyses it will be the applicant's responsibility to conduct more refined analyses.

- Simplistic modeling analyses for small businesses. DEQ may conduct the modeling analyses for small business in situations where there are a small number of sources and a simple facility layout. These decisions will be made on a case- by-case basis and will depend on current DEQ workload.

Modeling analyses performed by DEQ for permit applicants will typically be done outside of the regulatory review process and any review timelines. Data and results will typically be forwarded to the applicant for their review when the analyses are completed by DEQ staff. The applicant will then combine those analyses with other components of the application and submit the complete application to DEQ to initiate the agency review process.

Permit applicants will be responsible for submitting the following information/data to enable DEQ to perform modeling analyses:

- Detailed description of operations and equipment used.
- Requested allowable emissions rates for all criteria pollutants and TAPs for all applicable averaging periods.
- Maximum operational and material processing rates.
- Site description and scaled site plot plan, including a detailed description of any structures. Universal Transverse Mercator (UTM) coordinates, with the applicable datum listed, must be provided for all building corners, and heights of all building tiers must be provided.
- Emissions point information (stack location in UTM coordinates with the applicable datum listed, stack height, stack diameter, stack gas temperature, and flow rate) with thorough justification and documentation of such information.

If DEQ's analyses do not initially demonstrate compliance with applicable standards, it will be the applicant's responsibility to refine the analyses to achieve an adequate compliance demonstration.

DEQ has developed, or is in the process of developing, specific modeling approaches for several industrial types. For example, DEQ has conducted non-site-specific modeling for truck-mix concrete batch plants and portable hot-mix asphalt plants; and no source- specific modeling is require for these plants if they meet the production rate limits, minimum stack parameter specifications, and setback distances from specific receptors. DEQ air dispersion modeling staff should be consulted regarding availability and details of industry-specific modeling approaches.

2 Use of the Modeling Guideline

2.1 This Guideline Most Useful in Common Instances

This modeling guideline is presented as suggestions and instructions for performing a modeling analysis in the most common instances. The methods and data presented are not appropriate for all sources, locations, and/or situations, and use of a method presented in the guideline does not necessarily assure DEQ approval of the method. DEQ may approve or require methods and/or data differing from those presented in this guideline, depending on the characteristics of the specific situation.

2.2 Level of Knowledge Required to Use This Guideline

This guideline is not intended to educate permit applicants or consultants in the basic principles of atmospheric dispersion or in the operation of various dispersion models, as stated in Section 1.1. A wide variety of commercially available courses are available for applicants to develop the level of knowledge needed to correctly perform pollutant dispersion modeling analyses.

If your specialist (your staff) or consultant and cannot easily answer the following questions, they may not be adequately skilled to properly perform an air impact analysis involving dispersion modeling for air permitting purposes:

1. Have you performed an atmospheric dispersion modeling analysis within the last five years?
2. Do you understand why a stack with a horizontal or rain-capped release is sometimes modeled using a stack flow velocity of 0.001 meters per second?
3. Do you know what a significant impact is, and its implications for modeled impacts?
4. Do you know when background concentrations are used in a modeling analysis and when they are not?
5. Do you understand the difference between a significant impact analysis and a cumulative NAAQS impact analysis?
6. Do you know what surface roughness, Bowen ratio, and surface albedo are and how they are used in the model programs and preprocessor programs?
7. Do you understand the difference in how point sources, area sources, and volume sources are treated in AERMOD, SCREEN3, and/or AERSCREEN?
8. Do you know whether AERMOD uses daily or hourly meteorological data?

Permitting regulations require the applicant to demonstrate that emissions will not cause or significantly contribute to a violation of a standard. The regulations do not require that the analyses estimate actual impacts to the greatest degree possible. Therefore, it is advised that applicants use reasonably conservative data and methods to demonstrate compliance – data and methods that both DEQ and the applicant agree will generate impacts greater than those that would be reasonably expected. However, overly conservative estimates of input parameters, especially emission quantities, may substantially overstate impacts. This could result in the inappropriate applicability of certain requirements and/or the imposition of unnecessary permit provisions and restrictions.

Use of unrealistic release parameters, such as stack flow rates or stack gas temperatures, could shift the location of maximum impacts. In situations where the modeling analyses involve numerous sources, this could result in either under-estimation or over-estimation of combined impacts. Therefore, it is recommended that reasonably accurate release parameters be used when modeling multiple sources, rather than overly conservative parameters. In some instances, where reasonably expected parameters are highly variable, it may be more appropriate to use multiple operational scenarios to evaluate the effects of varying parameters.

3 Requirements to Perform Air Impact Analyses

This section outlines the permitting requirement to demonstrate compliance with NAAQS and TAP increments, and it describes when project-specific air impact modeling analyses are needed for issuance of a PTC or Tier II Operating Permit. It discusses pollutant-specific regulatory applicability, regulatory requirements for permit issuance, and calculation of emission increases for project modeling applicability.

3.1 Air Impact Analysis Regulatory Requirements for Permit Issuance

3.1.1 NAAQS and TAP Compliance Demonstration Requirements

Idaho Air Rules Section 203.02 states that "no permit to construct shall be granted for a new or modified stationary source or modified stationary source unless the applicant shows to the satisfaction of the Department" that the source or modification "would not cause or significantly contribute to a violation of any ambient air quality standard." Section 203.03 similarly requires that no permit be issued unless it is demonstrated through the use of methods in Section 210 that the source or modification would not "injure or unreasonably affect human or animal life or vegetation as required by Section 161."

Air impact analyses are also required for the issuance of Tier II Operating Permits, with requirements of Idaho Air Rules Section 403.02 mirroring Section 203.02 for PTCs. There are no TAP impact analysis requirements for Tier II Operating Permits.

3.1.2 Below Regulatory Concern Exemption from Demonstration Requirement

Certain projects may be exempt from the requirement to demonstrate compliance with NAAQS or TAP increments. If a project would qualify for a Below Regulatory Concern (BRC) permit exemption as per Idaho Air Rules Section 221 if it were not for potential annual emissions of one or more pollutants exceeding the BRC threshold of 10 percent of emissions defined by Idaho Air Rules as "significant," then a NAAQS compliance demonstration may not be required for those pollutants with emissions below BRC levels. DEQ's regulatory interpretation policy of exemption provisions of Idaho Air Rules Section 221.01 is that: "A DEQ NAAQS compliance assertion will not be made by the DEQ modeling group for specific criteria pollutants having a project emissions increase below BRC levels, provided the proposed project would have qualified for a Category I Exemption for BRC emissions quantities except for the emissions of another criteria pollutant.[1]" The interpretation policy also states that the exemption criteria of uncontrolled potential to emit (PTE) not to exceed 100 ton/year (Idaho Air Rules Section 220.01.a.i) is not applicable when evaluating whether a NAAQS impact analysis is required. A permit will be issued limiting PTE below 100 ton/year, thereby negating the need to maintain calculated uncontrolled PTE under 100 ton/year.

The BRC exemption cannot generally be used to exempt a project from a pollutant-specific NAAQS compliance demonstration where a PTC is required for the action regardless of emission quantities, such as the modification of an existing emission or throughput limit.

However, in this instance, if post-project facility-wide annual emissions of the criteria pollutant are also below BRC thresholds, then a NAAQS compliance demonstration is not required.

3.1.3 Regulatory Requirements of the Air Impact Analyses

Once a permit is required for a proposed project, an air impact analysis is required for permit issuance unless the pollutant can be exempt from the requirement to demonstrate compliance with NAAQS and TAP increments, as described above in Section 3.1.2. Idaho Air Rules Section 203 for PTCs and Section 403 for Tier II Operating Permits require that air impact analyses demonstrate compliance with NAAQS and TAP increments “to the satisfaction of the Department.” A key consideration is what constitutes DEQ satisfaction of compliance.

Use of unquestionably-conservative methods and data for all components of the analyses will generate predicted impacts that demonstrate compliance at near complete certainty. As analyses move back from methods and data that are highly conservative, then the certainty of NAAQS and TAP increment compliance decreases. Determining the point at which analyses no longer satisfactorily demonstrate compliance then becomes an important concern. This point is not defined in the regulations. DEQ asserts that a satisfactory compliance demonstration is an analysis where NAAQS and TAPs increment compliance is “highly confident,” considering all variability and uncertainty in analytical methods and data.

The confidence level of compliance with air quality standards will be affected by the following:

- Magnitude and spatial extent of modeled impacts in comparison to applicable thresholds or standards.
- Potential for public exposure to impacts exceeding standards.
- Representativeness of meteorological data used, and the accuracy/conservatism of meteorological data processing methods used.
- Uncertainty and variability of estimated emissions. Emissions that will be verified by source testing will be considered as near certainty, while emissions based on low-ranked AP-42 factors (which usually represent an average across the industry) will be considered as low confidence.
- Method used to account for atmospheric chemistry (NO/NOx chemistry primarily).
- Representativeness and conservatism of background concentrations (note that using design value background levels with design value modeled results is more conservative for short-averaging periods than for annual averaging periods).
- Level of conservatism in modeling expected operational scenarios (handling variable load conditions, multiple intermittent sources, etc.).
- Representativeness/conservatism of methods used to handle complex emission points such as fugitive releases.
- Handling of building downwash.
- Handling of complex terrain.
- Methods use to hand co-contributing sources in a cumulative impact analysis.

3.2 Emission Thresholds Triggering Site-Specific Impact Analyses

Emission quantities from a source directly affect pollutant impacts to ambient air, and therefore affect the likelihood of a source to cause or contribute to a violation of an ambient air quality standard. Where emission rates are minimal, DEQ can be highly confident that the source will not cause or contribute to a standard violation without performing an impact analysis using pollutant dispersion modeling. Screening Emission Levels (ELs) are specified in the Idaho Air Rules as a de *minimis* TAP emission quantity, below which compliance with the TAP increment is assured. De *minimis* levels for criteria pollutants are not specified in Idaho Air Rules. However, this section presents criteria pollutant de *minimis* levels that DEQ asserts will reasonably assure NAAQS compliance for various circumstances. These levels were established using the professional judgement of DEQ scientists and engineers, combined with results from computerized pollutant dispersion models for various generic configurations.

DEQ established emission de *minimis* levels as a function of the Significant Emission Rates (SERs) defined in Idaho Air Rules Section 005.108. The SERs are expressed as annual emission rates. To use SERs for NAAQS with short-term averaging periods, the SER is divided by 8,760 hours/year and compared to maximum hourly emissions for 1-hour standards or maximum daily emissions divided by 24 for 24-hour standards. DEQ also developed Significant Impact Level (SIL) thresholds for modification projects; emissions less than these rates are reasonably assured to have impacts less than the applicable SIL. SIL thresholds were developed by DEQ using dispersion modeling analyses of a generic facility with one point source.

Whether a specific emission quantity can cause or contribute to a violation greatly depends on whether those emissions occur from a new facility or are added to those of an existing facility, and whether the existing facility has recently demonstrated NAAQS compliance on a facility- wide basis through dispersion modeling. The confidence of NAAQS compliance is high where project emissions occur from a proposed new facility in an attainment area and predicted emission quantities are low. NAAQS compliance confidence is also high for projects at existing facilities where facility-wide air impact analyses were recently performed and emissions associated with the modification are minimal. Even if the increase in emissions at a previously modeled existing facility could cause impacts exceeding the SIL, it is unlikely that impacts could exceed the NAAQS when combined with co-contributing sources and background concentrations. This is because any high impacts from new sources are not likely to coincide in time and space with high impacts from the existing facility. In the unlikely event that such minimal emissions combine with a high background concentration and impacts from nearby sources to produce an impact exceeding the NAAQS, it is likely that such impacts would only occur in a small area, would only occur for limited periods, and would not affect areas where sensitive individuals could be present.

A modeling applicability threshold assuring project impacts less than the SIL is used for modification projects to facilities where facility-wide NAAQS compliance demonstrations have not been recently performed. This threshold assures with high confidence that the project will not significantly contribute to any potentially existing NAAQS violation. These threshold values were based on modeling of a generic DEQ-generated facility, using the AERMOD regulatory model with Idaho meteorological data. The analyses used the following parameters: stack height = 10 meters; stack diameter = 0.5 meters; velocity at stack exit = 10 meters/second; stack gas temperature at exit = 200 ^{o}F; ambient air is at a distance of 100 meters from the stack; the stack is centered on a 10 meter square building, 5 meters high. The SIL thresholds are emission rates that, when modeled using the generic DEQ-generated facility, result in impacts just below the applicable SIL.

Figures 1 and 2 show the project-specific air impact analysis applicability determination process for new facilities and modifications to existing facilities, respectively. This process should only be used for projects proposed in attainment or unclassifiable areas. DEQ should be consulted if a proposed project is located in a non-attainment area. Also, if DEQ observes project-specific conditions that suggest a threshold is not appropriate or protective of NAAQS, then DEQ may require project-specific air impact modeling even though emissions are below the listed threshold.

Table 2 lists the modeling applicability threshold values referenced in Figures 1 and 2.

Table 2. Modeling Applicability Thresholds (values in pounds/hour[(a)])

Pollutant and Averaging Period	SIL Threshold	BRC	1/8 SER	1/4 SER	SER
CO 1-hr	84	2.3[b,c]	2.9[b]	5.7[b]	100 ton/yr
CO 8-hr	26	2.3[b,c]	2.9[b]	5.7[b]	100 ton/yr
NO_2 1-hr	0.38	0.91[c]	1.14	2.3	40 ton/yr
NO_2 ann	0.43 (1.9 ton/yr)	4.0 ton/yr	5.0 ton/yr	10.0 ton/yr	40 ton/yr
SO_2 1-hr	0.40	0.91[c]	1.14	2.3	40 ton/yr
PM_{10} 24-hr	0.32	0.34[c]	0.43	0.86	15 ton/yr
$PM_{2.5}$ 24-hr	0.092	0.23[c]	0.29	0.57	10 ton/yr
$PM_{2.5}$ ann	0.085 (0.37ton/yr)	1.00 ton/yr	1.25 ton/yr	2.5 ton/yr	10 ton/yr
Pb 3-month	0.00102 (0.73 lb/mon)	9.9 lb/mon	12.3 lb/mon	24.7 lb/mon	0.6 ton/yr

a) Values in pounds/hour as averaged over the averaging period of the NAAQS, unless noted otherwise. Pound/hour values listed as a function of the SER were calculated by dividing the annual SER value by 8,760.

b) These values are more restrictive than the SIL Threshold. Therefore, the SIL Threshold may be used in place of these values.

c) BRC is based only on annual emissions. The pounds/hour values listed as BRC for short term standards are the annual BRC rate divided by 8,760 hours/year. Annual emissions from the project should be divided by 8,760 hours/year and then compared to the listed pounds/hour BRC threshold to evaluate whether the project can be exempt from NAAQS compliance demonstration requirements for the applicable pollutant.

d) These values are more restrictive than the SIL Threshold. Therefore, the SIL Threshold may be used in place of these values.

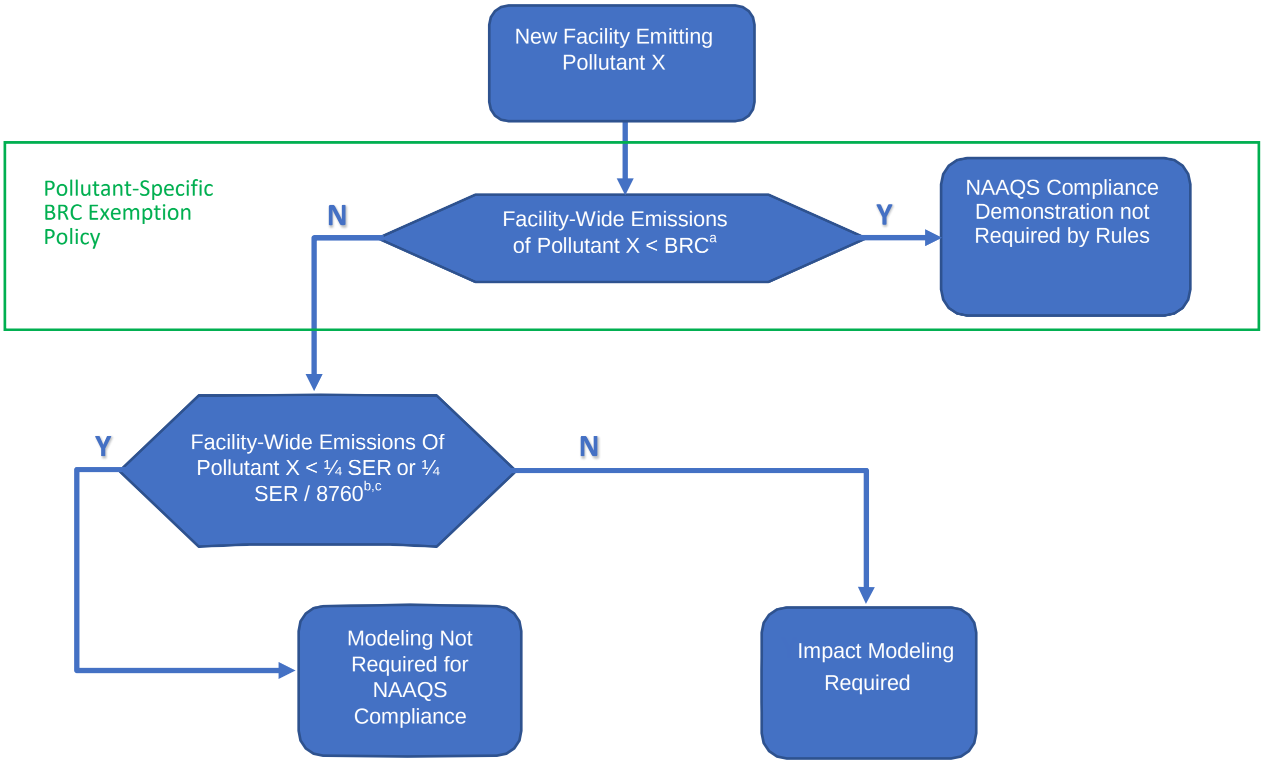

Figure 1. Pollutant-Specific Modeling Applicability Flow Chart for New Facilities in Attainment or Unclassifiable Areas

a) This evaluation is DEQ's regulatory interpretation of permit exemption rules, as described in: *Policy on NAAQS Compliance Demonstration Requirements*. Idaho Department of Environmental Quality Policy Memorandum. July 11, 2014. The evaluation is based only on annual emissions, and emissions qualifying as "fugitive" as defined by Idaho Air Rules for permit applicability are not included in the evaluation. Example: A company proposes to construct a widget maker facility. The project would qualify for a BRC permitting exemption under Idaho Air Rules Section 221.01, with emissions of Pollutant X below the BRC threshold, except that emissions of Pollutant Y exceed the BRC threshold and trigger the requirement to obtain a PTC. By DEQ regulatory interpretation, a NAAQS compliance demonstration for Pollutant X is not required by Idaho Air Rules for permit issuance.

b) Emissions calculated according to DEQ-specified methods. Fugitive emissions associated with the project are included in this evaluation. The threshold of 1/4 SER is applicable to NAAQS regulated on an annual average; and 1/4 SER/8760 is applicable to NAAQS on a short-term average, with the pound/hour threshold value compared to the maximum potential/allowable emission for the averaging period divided by the hours in the averaging period.

c) If DEQ observes project-specific conditions that suggest these thresholds are not appropriate or protective of NAAQS, then DEQ may require project-specific air impact modeling even though emissions are below listed thresholds.

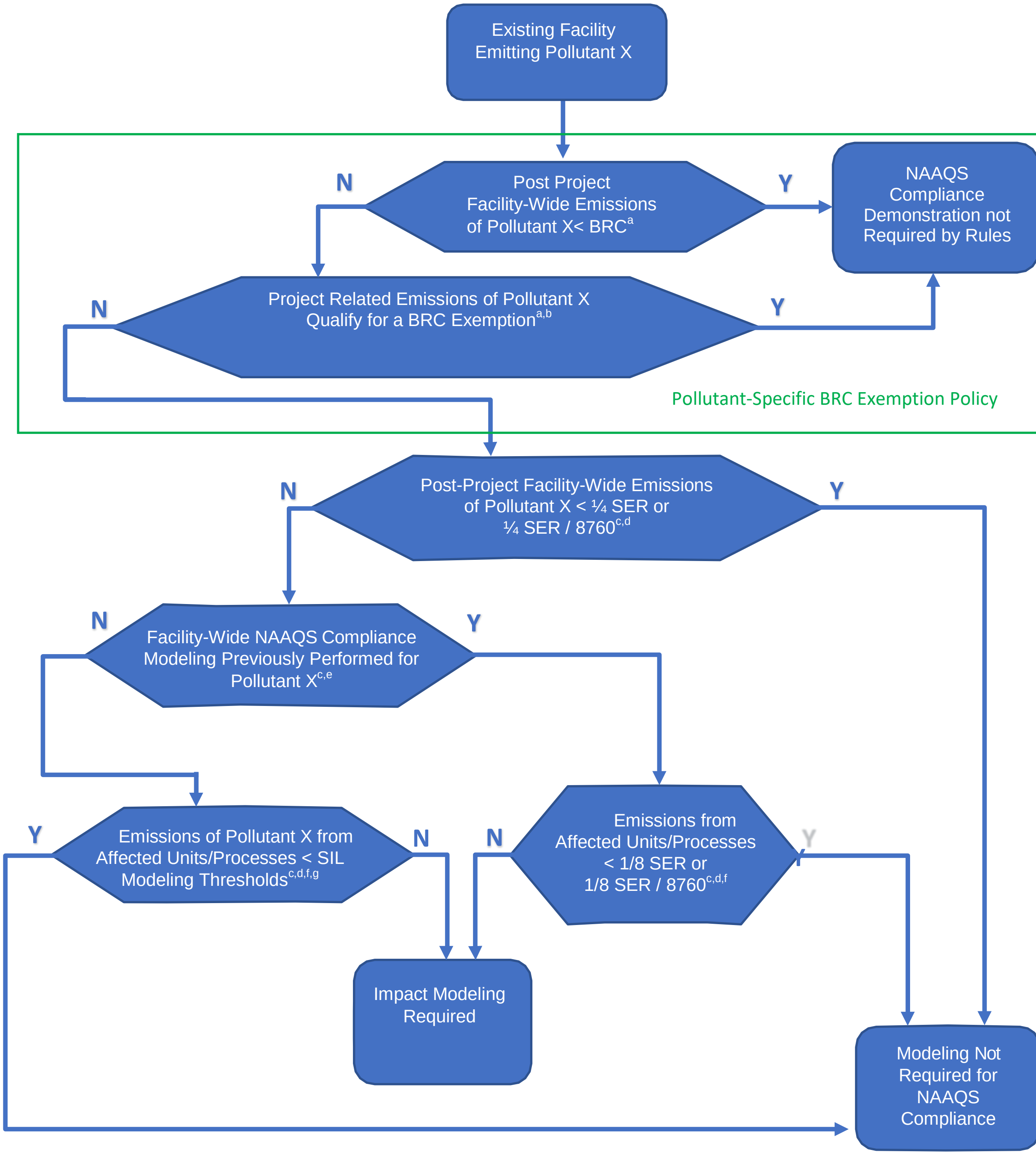

Figure 2 Pollutant-Specific Modeling Applicability Flow Chart for Modifications to Existing Facilities in Attainment or Unclassifiable Areas

a) This evaluation is DEQ's regulatory interpretation of permit exemption rules, as described in: Policy on NAAQS Compliance Demonstration Requirements. Idaho Department of Environmental Quality Policy Memorandum. July 11, 2014. The evaluation is based only on annual emissions, and emissions qualifying as "fugitive" as defined by Idaho Air Rules for permit applicability are not included in the evaluation.

b) Examples:

1. A company proposes to construct a widget maker at their existing facility. The project would qualify for a BRC permitting exemption under Idaho Air Rules Section 221.01, with emissions of Pollutant X below the BRC threshold, except emissions of Pollutant Y exceed the BRC threshold and trigger the

requirement to obtain a PTC. By DEQ regulatory interpretation, a NAAQS compliance demonstration for Pollutant X is not required by Idaho Air Rules for permit issuance.

2. A facility proposes to increase production at their existing, permitted widget maker. The existing permit limits widget production at 50 widgets per hour. The project proposes to increase production to 100 widgets per hour. The increase in emissions of Pollutant X is below the BRC threshold, but total emissions of Pollutant X from the unit are above the BRC threshold. A NAAQS compliance demonstration for Pollutant X is required because the project could not qualify for a permitting exemption, regardless of the emissions from other pollutants. The modification requires changing an existing permit condition, and therefore, could not qualify for a BRC exemption.

c) Fugitive emissions associated with the project are included in this evaluation.

d) If DEQ observes project-specific conditions that suggest these thresholds are not appropriate or protective of NAAQS, then DEQ may require project-specific air impact modeling even though emissions are below listed thresholds.

e) This applies if facility-wide modeling of the specific pollutant was performed for the averaging period of the NAAQS. Facility-wide modeling may be associated with a past permitting project or performed independently, and it may conservatively use allowable emissions or a more-refined reflection of actual emissions. Modeling must have been approved by DEQ, performed within the previous five years, be representative of the existing facility and operations, and include the pollutant of interest.

f) Emissions increase calculated according to DEQ-specified methods, including methods to handle projects involving relaxation of an emission-affecting permit limit.

g) SIL Modeling Threshold based on modeling of a generic hypothetical source.

3.3 Emission Increase Calculation for Project-Specific Modeling Applicability

Whether project-specific air impact modeling is required for a project depends on the increase in emissions resulting from implementation of the project. The emission increase for a new facility is simply the sum of potential or permit-allowable emissions from all emission sources associated with the project. The emission increase for a modification is defined in Idaho Air Rules as “the amount by which projected actual emissions exceed baseline actual emissions of an emissions unit.” Section 3.3.2 provides more details on calculating the emission increase associated with modifications for modeling applicability.

The following types of emissions sources should be included in the modeling applicability calculation:

- All emissions sources that may be included in the permitting analyses or the issued permit, regardless of whether those sources may have (or will be issued) emissions or operating limits. Sources that are exempt from permitting as per Idaho Air Rules Section 220-223 must normally be included in the modeling applicability calculation. DEQ’s modeling group should be consulted if there are questions regarding the inclusion or exclusion of emission sources in the modeling applicability determination.
- Process fugitive emissions from material handling, processing, etc. Fugitive emissions from vehicle traffic on facility roadways and wind erosion emissions from storage piles will not typically be considered for minor source permitting applicability unless DEQ determines such sources may have a substantial contribution to ambient concentrations. Mining facilities are typically in this category where such fugitive sources must be included.
- Intermittent sources such as batch processes, flaring, bin dumping, engine testing, etc. Emissions of NOx from intermittent testing of engines powering emergency generators and fire suppression water pumps can typically be excluded from the modeling applicability

determination for 1-hour NO2 NAAQS compliance demonstrations. Appendix A provides DEQ's final guidance on the modeling of NOx from intermittent testing and maintenance operations of engines powering emergency generators and fire suppression water pumps.

Sections 3.3.1 and 3.3.2 describe how emission quantities should be calculated for various scenarios to evaluate the need to conduct project-specific impact modeling. The modeling applicability emission inventory (used to determine whether modeling is needed) may be different than the modeling analysis emission inventory (used to conduct a significant impact analysis), as explained in Section 6.3.1.

3.3.1 Determining Whether Modeling is Needed for a New Source or Facility

Proposed allowable emissions, as specified in a permit application or calculated as potential to emit, of all new emissions sources will be used to evaluate the need for modeling a proposed new emissions source or new facility. No emission sources are typically exempt from the evaluation of whether modeling is needed. Also, any reductions in emissions at a different source cannot be considered at the modeling applicability stage.

3.3.2 Determining Whether Modeling is Needed for Modifications

Air impact modeling requirements for a modification hinge on the quantity of increased emissions that could occur as a result of the modification. For the purpose of project-specific applicability for performing an air impact analysis, any emission decreases are not typically considered. Creditable decreases may be considered in air impact modeling performed once the requirement to perform impact modeling has been established. If removal of an existing source or installation of control equipment on a source occurs concurrently with a modification, the emission reduction associated with such activities will not typically be considered in the evaluation of whether emissions exceed modeling applicability thresholds.

Emission increases for a modification must be carefully calculated to obtain an accurate or conservative assessment. From a regulatory standpoint, "Emissions Increase" is defined in Idaho Air Rules Section 007.04 as, "The amount by which projected actual emissions exceed baseline actual emissions of an emissions unit." Baseline actual emissions are a best-estimate of emissions that could realistically occur by operation of the source before modification. If the source is permitted, such emissions may be those allowed under the restrictions of the existing permit (using best available emission estimation methods and considering the permit limits that are the most restrictive to emission-causing operations). The following should be considered when calculating baseline actual emissions to evaluate the need for project-specific modeling:

- For a given process, the same emission calculation method and emission-affecting assumptions should be used for baseline actuals as is used for calculating future permit allowables, unless there are changes in the process that necessitate using different methods and assumptions. A change in emission factors or methods used to estimate emissions from a given process cannot be used to reduce the change in emissions associated with a proposed modification.
- Emissions considered as a conservative estimate for post-project allowable emissions (over-estimation of emissions), will result in an overestimate of baseline actual emissions for future projects. This may then result in an underestimation of the future project emission increase. DEQ approval of a conservatively high emission estimate of a source for initial permitting may not be appropriate for calculating baseline emissions for a future modification. However, the same emission factor or estimation method should be used for a given process, as noted in the previous bullet. For example, if a project involves increasing allowable throughput and the

emission generating mechanism does not change, the same emission factor should be used for both baseline actual emissions and post-project allowable emissions. Also, the applicant should use a factor they are confident does not underestimate post-project allowable emissions, even if it is suspected use of the factor overstates baseline actual emissions.

- Permit applicants should not simply use emission factors and other emission-affecting parameters from previous air impact analyses as a representation of baseline actual conditions. Many previous analyses were only required to demonstrate that the project will not cause a violation, and this was often accomplished by using simplistic estimates that substantially overestimate emissions. More accurate and updated emission rate data and release parameter information are frequently available for a source after initial permit issuance. This results from performance tests or from changes in emission factors. Baseline actual emissions should generally be calculated using the most accurate methods available. Overestimating baseline emissions will result in underestimation of the change in emissions resulting from a modification.
- Full operational levels (as allowed by the existing permit) can be considered in the calculation of baseline actual emissions, provided the facility/equipment could have accommodated such a level of operation. For example, a certain unit has a throughput limit of 1,000 units per day, and operational records indicate that only a maximum of 900 units per day has been processed. Baseline emissions can be calculated by assuming 1,000 units per day if it can be demonstrated that the facility could effectively attain those levels without a facility modification.
- Many permits contain both specific emission limits and limits on production. Baseline emissions must be based on the most restrictive limitation in the permit. As an example, consider a case where source testing has demonstrated that emissions per unit of production are lower than anticipated during initial permitting. As part of a proposed modification, the facility would like to raise the allowable production rate but not change the permitted emission rate. In this case, there will be an increase in allowable emissions because there is an increase in throughput. However, the applicant may calculate the increase in emissions using an updated emission factor that is based on recent source testing.

Future projected actual emissions will simply be permit-allowable emissions. Conservative emission estimates that overstate these emissions are acceptable and encouraged to facilitate expeditious DEQ approval of the modeling-applicability calculation.

Relaxation of Existing Permit Restrictions

Some modification projects involve the relaxation of an existing emission-affecting permit restriction, such as throughput limit, limit on hours of operation, material restriction on the type of material processed, or a direct emissions limit. In these cases, especially where the existing limit was needed to assure compliance with a NAAQS or a TAP increment, DEQ may require that the entirety of emissions from the unit be considered for modeling applicability rather than the increase alone. This approach is used because of the following:

- An increase in emissions at an existing emission point is more likely to cause or contribute to a NAAQS or TAP increment violation than if those emissions occurred at a new point. This is because emissions at two separate points must have overlapping plumes for their impacts to be additive.
- If a limit was needed on an emission point to assure NAAQS or TAP increment compliance, then increasing emissions at such a point would likely cause a violation.

This approach is intended to address potential “sham” permitting. A sham permit occurs when a facility originally intends to operate at a certain level, and equipment permitted is fully capable of operating at such levels, but NAAQS or TAP increment compliance cannot be demonstrated. As a result, the facility is issued a permit limit on the source(s) to assure compliance. Sometime after permit issuance, the facility then submits a permit application to relax the limit, addressing only the increase from the previous limit for impact analyses. This approach effectively circumvents the requirement to comply with NAAQS and/or TAP increments. To address this concern, the emission increase is calculated using a baseline associated with the facility prior to issuance of the permit establishing the limit that the facility now proposes to relax.

Generally, DEQ will use a 5-year period during which a project that involves relaxation of a limit (without a physical change at the facility) will be considered an adjustment/correction of previous permitting project rather than a new project. The emission increase will be calculated using the base emissions allowable prior to the previous permitting project (the project that established the limit to be relaxed) and the new proposed limit.

Replacement Projects

The need for modeling replacement projects that do not qualify as routine replacement is based on total allowable emissions from the proposed new source. The decrease in emissions associated with the removal of the old equipment is not generally considered for modeling applicability.

For example, if a sawmill proposes replacing an existing kiln with a new kiln (not routine replacement), modeling applicability would be based on the proposed allowable emissions of the new kiln without any consideration of the decrease in emissions associated with removal of the older kiln. The creditable emissions decrease associated with the kiln removed can be used in the air impact modeling to offset the emissions from the new kiln, modeled as negative values to evaluate the net impact of the project.

Modification of a Permitted Source

This scenario involves alteration of an existing and permitted emissions source. The need for modeling is normally based on the emission increase as determined by the difference between baseline actual emissions and future projected emissions (permit allowables). However, if the modification alters the release characteristics of the source (temperature, stack gas flow rate, stack height, etc.), then the entire allowable emissions from the modified source must be included for the purpose of modeling applicability. If the emission release characteristics do not change, then the applicable emissions will be considered as the increase resulting from the modification. An example of this is increased emissions-generating activities (that do not affect the temperature or volume of air exhausted) in a room where air is exhausted to the atmosphere through an existing stack. The emissions increase would be calculated as the difference between the current emissions rate and the new proposed allowable emissions rate. Determining the need for project-specific air impact modeling based on only the increase in emissions is approved by DEQ on a case-by-case basis, considering whether the point of release and release characteristics are very similar between the existing and modified emissions points.

A permit is not specifically required for instances where physical changes made at a facility affect dispersion but do not meet the definition of a “modification.” Although such changes do not typically require a permit, they do effectively invalidate any dispersion modeling analyses performed prior to those changes and could alter the NAAQS compliance status of the facility. In some cases, DEQ may request facilities to perform air quality dispersion modeling analyses to affirm compliance with applicable standards.

4 Applicable Standards

This section discusses the applicable standards for assessing impacts on ambient air.

4.1 Criteria Pollutants

Table 3 lists the significant impact levels (SILs) used to determine whether or not the proposed project would have a significant impact on the air quality in the area. The proposed project has a significant impact on the ambient air quality if the resulting ambient concentrations exceed these levels due to an emissions increase.

Table 4 presents the NAAQS which are incorporated by reference (IBR) into Idaho Air Rules Section 107.03.b. Typically, there is about a year of lag time between when a new NAAQS is promulgated by EPA and the time when it is IBR into Idaho Air Rules. A NAAQS compliance demonstration involving modeling analyses for a specific standard is only required for permits issued after the date the standard is IBR into Idaho Air Rules. In cases where a NAAQS has been promulgated by EPA but not yet IBR to Idaho Air Rules, DEQ should be consulted for a determination on what specific analyses may be required for permit issuance.

Table 3. Significant Impact Levels (IDAPA 58.01.01.006)

Pollutant	Averaging Time	Significant Impact Levels ($\mu g/m^3$)[a]
CO	1-hour	2000
CO	8-hour	500
NO2	1-hour	4 ppb[b,c] (7.5 $\mu g/m^3$)[d]
NO2	Annual	1.0
SO2	1-hour	3 ppb[e] (7.9 $\mu g/m^3$)[d]
SO2	3-hour	25
SO2	24-hour	5
SO2	Annual	1.0
PM_{10}	24-hour	5.0
PM_{10}	Annual	1.0
$PM_{2.5}$	24-hour	1.2
$PM_{2.5}$	Annual	0.3[f]

a) Micrograms per cubic meter
b) ppb - parts per billion
c) Interim SIL (EPA 2010a)
d) µg/m3 value calculated for standard conditions
e) Interim SIL (EPA 2010b)
f) This value is the upper limit as listed in 40 CFR 51.165(b)(2). Without monitoring data supporting this value, DEQ will use the 0.2 $\mu g/m^3$ value recommended by EPA (EPA 2018)

Table 4. National Ambient Air Quality Standards

Pollutant	Averaging Time	Standard ($\mu g/m^3$)[a]
CO	1-hour	40,000[b]
CO	8-hour	10,000[b]
NO2	1-hour	100 ppb [c] (188 µg/m3)
NO2	Annual	100[d]
SO2	1-hour	75 ppb[e] (196 µg/m3)
SO2	3-hour	1,300[b]
SO2	24-hour	365[b]
SO2	Annual	80[c]
PM_{10}	24-hour	150[f]
PM_{10}	Annual	50[g]
$PM_{2.5}$	24-hour	35[h]
$PM_{2.5}$	Annual	12[i]
Pb	Quarterly	1.5[j]
Pb	3-month	0.15[k]

a) Micrograms per cubic meter.
b) Not to be exceeded more than once per year.
c) Three-year average of the 98th percentile of the annual distribution of 1-hour average daily maximum concentrations not to exceed standard.
d) Not to be exceeded in any calendar year.
e) Three-year average of the 99th percentile of the annual distribution of 1-hour average daily maximum concentrations not to exceed standard.
f) Never expected to be exceeded more than once in any calendar year.
g) Standard has been revoked.
h) Three-year average of the 98th percentile of the annual distribution of 24-hour average concentrations not to exceed standard,
i) Three-year average of the annual mean concentrations not to exceed standard.
j) Not to be exceeded in any quarter of any calendar year.
k) Not to be exceeded in any 3-month rolling average of any calendar year.

4.2 TAPs Increments

Applicable TAPs increments are listed in Idaho Air Rules Section 585 for non-carcinogens (AACs) and 586 for carcinogens (AACCs). The tables found in these sections of Idaho Air Rules list the ELs in pounds per hour (lb/hr) as well as the AACs for non-carcinogens and AACCs for carcinogens. Note that the concentrations for the non-carcinogens are in units of milligrams per cubic meter (mg/m3) and the concentrations for carcinogens are in units of micrograms per cubic meter (g/m3).

4.3 Toxics

Idaho Air Rules Section 161 states, “Any contaminant which is by its nature toxic to human or animal life or vegetation shall not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation.” DEQ may require toxics analyses as a case-by-case basis in instances where DEQ suspects impacts of toxics may have an unacceptable impact.

5 Modeling Methodology

The required level of analysis will generally depend on the complexity of the proposed construction or modification, surrounding emissions sources and terrain features, current air quality levels, and classification (attainment vs non-attainment) in the impact area. Screening techniques may be adequate for simplistic or isolated sources. Screening techniques are not appropriate in complex situations such as a large number of buildings in the immediate area that create downwash for a point source or the presence of complex terrain within the modeling domain. More refined modeling will be necessary when screening modeling is inappropriate or cannot demonstrate compliance with applicable air quality impact limits.

5.1 Requirements for Permit Applications

As recommended by EPA (EPA 1990), dispersion modeling analysis generally involves two distinct phases. The first phase is the preliminary analysis, also known as the significant impact analysis; the second phase is the full impact analysis, also known as the cumulative NAAQS analysis. These analyses may be performed with either a simple “screening model” or with a more complex “refined model.” A flowchart showing the general modeling methodology for permit modeling is presented in Figure 3.

5.1.1 Significant Impact Analysis

In the significant impact level (SIL) analysis, the highest estimated concentration in ambient air is compared to the SILs in Table 3. A five-year mean of the highest estimated concentration from each year can be used in the SIL analysis for pollutants with probabilistic standards. These pollutants include 24-hour PM2.5, annual PM2.5, 1-hour NO2, and 1-hour SO2. Only the changes in emissions associated with the proposed project are modeled in the significant impact analysis for new sources or modifications. Impacts from nearby and other background sources, including background concentrations, are not considered in the significant impact analysis. Section 6.3 provides guidance on sources and emissions to include in the significant impact analysis. No further analysis is generally required for the NAAQS or PSD increments if the estimated concentration is below applicable SILs. The source or modification is determined to have a significant impact on ambient air if the estimated impact exceeds the SILs. In this case, a cumulative NAAQS analysis will be necessary to demonstrate to the satisfaction of DEQ that the stationary source or modification would not cause or significantly contribute to a violation of any ambient air quality standard. Also, if DEQ has information that indicates existing facility emissions may not meet NAAQS, then DEQ may require the facility to demonstrate full NAAQS compliance at the time of the current permitting action or a later date.

The ambient concentration due to any proposed construction or modification cannot exceed the SILs listed in Table 3 for minor stationary sources in non-attainment areas (NAAs). Offsets are required even if the ambient impacts are below the SILs for major stationary sources or major modifications at major stationary sources in NAAs. The DEQ air modeling coordinator should be contacted for locations of NAAs in Idaho.

5.1.2 Cumulative NAAQS Analysis

In a cumulative NAAQS analysis, the scope of the analysis is expanded from the significant impact analysis to include impacts from all other sources at the facility and background concentrations. Assessing impacts from potential co-contributing sources may also be required in the cumulative NAAQS analyses. It is the applicant's responsibility to identify potential co- contributing sources. The factors to be reviewed include the type of source, distance between the facilities, location of potential impact, pollutants emitted, and emission rates of pollutants of interest. If impacts of neighboring sources, on receptors showing a significant impact from the sources subject to the permitting action, are not adequately accounted for by the background concentration used, then emissions from those sources must be modeled.

When conducting cumulative NAAQS modeling, the sources not explicitly included in the model (e.g., mobile sources; small, stationary sources; some fugitive sources; and large, distant sources) are accounted for by adding a background concentration representative of the air quality in the area. Background concentrations are based on ambient air monitoring data collected in the area or from similar areas determined to be reasonably representative. Section 6.10 provides a more detailed discussion of appropriate background concentrations. Background concentrations must account for all impacts not accounted for by sources specifically modeled. Current default background concentrations must be obtained from a DEQ air quality modeler.

Modeling assessments for major new source/modifications subject to the PSD program, and where project emissions cause an impact exceeding SILs, must include emissions from all point sources within the radius of significant impact and all sources outside the radius of significant impact that cause a significant impact within the radius of significant impact.

5.2 Additional Requirements for PSD Applications

Major facilities subject to PSD rules have many more responsibilities in the permitting process. DEQ engineers and analysts make the final determination of PSD applicability. If the proposed project is subject to PSD, the applicant should consult with DEQ during the early phases of the project development. If the proposed project is subject to PSD, the applicant should consult with DEQ during the early phases of the project development. This guideline only provides a brief summary of the PSD permitting program.

A PSD review is required if a proposed new facility is defined as a designated facility (Table 5) and emits or has projected actual emissions, after controls, of 100 tons per year (T/yr) or more of any regulated air pollutant. If the new facility is not one of the types listed in Table 5, then a PSD review is required if the facility emits or has projected actual emissions, after controls, of 250 T/yr or more of any regulated air pollutant. For PSD review, the potential to emit is defined as the maximum capacity of a stationary source to emit a pollutant under its physical and operational design (defined in Idaho Air Rules Section 006). A PSD review is also required if proposed emissions from a modification to an existing PSD major source are greater than the significant emissions rates listed in Table 6.

The location of the facility is important, as it determines the applicable increment of allowable air quality deterioration. Other factors, such as the topography and meteorology of the area and the proximity to a Class I area (specified areas of pristine air quality such as certain national parks, wilderness areas, etc.) or NAA, also determine the control requirements. The allowable increments, as of the publication of this document, for Class I, II, and III areas are listed in Table 7. Additional increment limits can be promulgated by the EPA or DEQ, so it remains the applicant's responsibility to verify applicable PSD increment limits. The Class I areas in Idaho and surrounding states are shown in Appendix B. The remainder of the state is currently designated as Class II. There are no Class III areas in Idaho.

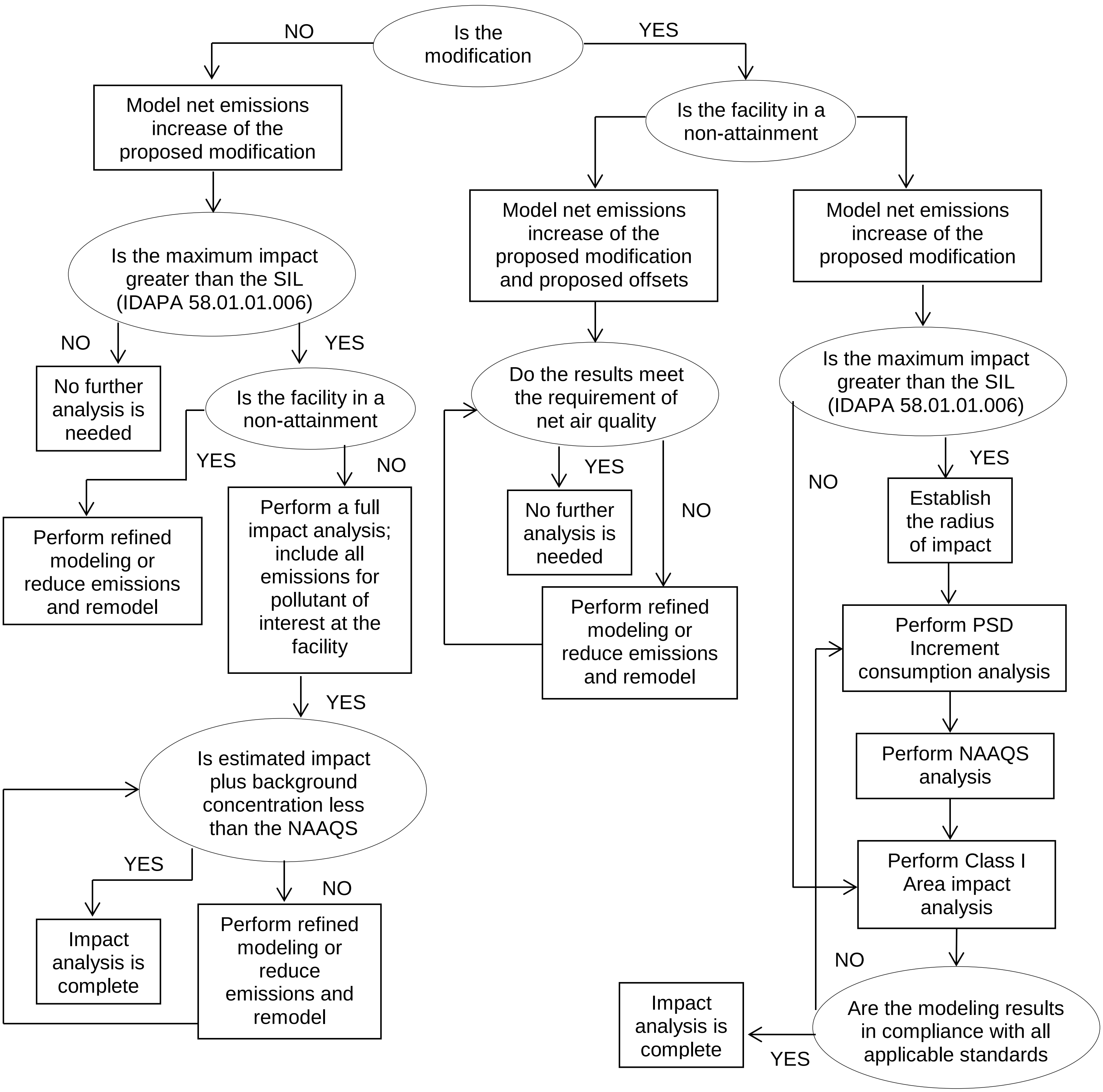

Figure 3. Flow Chart for Criteria Pollutant Ambient Impact Analysis for Permit to Construct Application

Pre-construction air quality is determined through ambient air monitoring. In some cases, there may already be enough data to establish the baseline. However, the applicant may be required to conduct up to one year of ambient monitoring at strategic locations if monitoring data are not available for the source area of the proposed construction site. Pre-construction monitoring will automatically be required if the model-predicted impact of the proposed source exceeds the levels in Table 8 and there are no current ambient air monitoring data available. DEQ may require pre-construction monitoring in other situations.

The following additional analyses are required in PSD applications:

- PSD increment consumption
- Class I area visibility and Air Quality Related Values (AQRVs) analysis
- Growth analysis
- Ambient air quality impact analysis (during construction)
- Soils and vegetation impacts
- Visibility impairment (in impact area, separate from the Class I area visibility analysis)

Refer to the *New Source Review Workshop Manual* (EPA 1990) for additional guidance.

Designated Facility Types as found in IDAPA.58.01.01.006:

1. Fossil fuel-fired, steam electric plants of more than 250 million British thermal units (Btu)per hour heat input
2. Coal cleaning plants (with thermal dryers)
3. Kraft pulp mills
4. Portland cement plants
5. Primary zinc smelters
6. Iron and steel mill plants
7. Primary aluminum ore reduction plants
8. Primary copper smelters
9. Municipal incinerators capable of charging more than 250 tons of refuse per day
10. Hydrofluoric acid plants
11. Sulfuric acid plants
12. Nitric acid plants
13. Petroleum refineries
14. Lime plants
15. Phosphate rock processing plants
16. Coke oven batteries
17. Sulfur recovery plants
18. Carbon black plants (furnace process)
19. Primary lead smelters
20. Fuel conversion plants
21. Sintering plants
22. Secondary metal production plants
23. Chemical process plants
24. Fossil fuel boilers (or combination thereof) totaling more than 250 million Btu/hour heat input
25. Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels
26. Taconite ore processing plants
27. Glass fiber processing plants
28. Charcoal production plants

Table 5. Significant Emissions Rates (40 CFR 52.21 (b)(23); IDAPA 58.01.01.006)[(a)]

Pollutant	Emission Rate (T/yr)
CO	100
NOX	40
SO2	40
PM_{10}	15
$PM_{2.5}$	10 (40)[(b)]
Particulate matter	25
Ozone (VOC)	40 (of VOCs)
Pb	0.6
Asbestos	0.007
Beryllium	0.0004
Mercury	0.1
Vinyl chloride	1
Fluorides	3
Sulfuric Acid Mist	7
Hydrogen Sulfide (H_2S)	10
Total Reduced Sulfur (including H_2S)	10
Radionuclides from facilities regulated under40 CFR Par 61, Subpart H	0.1 mrem/yr
Reduced sulfur compounds (Including H_2S)	10
Any other pollutant regulated under the Clean Air Act including radionuclides	Any emission rate
Each regulated pollutant (from a major facility or major modification)	Emission rate that causes air quality impact of 1 µg/m3 or greater (24-hour basis) in any Class I area located within 10

a) A PSD review is required if the operation is modified and actual emissions of a pollutant will be greater than shown above

b) SO_2, NOx, and VOCs as precursors

Table 6. Prevention of Significant Deterioration Increment Limits

Pollutant	Averaging Period	Class I (µg/m^3)	Class II(µg/m^3)	Class III (µg/m^3)
NO_2	Annual[(c)]	2.5	25	50
SO_2	Annual[(b)]	2	20	40
SO_2	24-hour[(c)]	5	91	182
SO_2	3-hour[(c)]	25	512	700
PM_{10}	Annual[(b)]	4	17	34
PM_{10}	24-hour[(c)]	8	30	60
$PM_{2.5}$	Annual[(b)]	1	4	8
$PM_{2.5}$	24-hour[(c)]	2	9	18

a) The Class I, II, and III areas are defined and shown in Appendix A.

b) Never to be exceeded.
c) Not to be exceeded more than once a year.

Table 7. Modeled Impacts Above which Preconstruction Monitoring cannot be Exempted for PSD-Applicable Projects

Pollutant	Ambient Concentration (μg/m^3)	Averaging Period
CO	575	8-hour
NO2	14	Annual
SO2	13	24-hour
PM10	10	24-hour
PM2.5	4	24-hour
Ozone	100 T/yr increase of VOCs	N/A
Pb	0.1	Quarterly
Mercury	0.25	24-hour
Beryllium	0.0001	24-hour
Fluorides	0.25	24-hour
Vinyl chloride	15	24-hour
Hydrogen sulfide	0.2	1-hour

5.3 Facility Emission Cap (FEC) Permit Modeling

Contact DEQ for guidance on modeling requirements for FEC permits. In general, the modeling submitted must support all possible future emissions rates sources, and facility configuration.

6 Performing a Modeling Analysis

An application will be considered incomplete if it lacks sufficient information and/or a valid modeling analysis, supported by adequate documentation and justification of methods and data. Appendix C includes a copy of the DEQ modeling checklist, which is designed to help the applicant prepare the information necessary for a complete modeling package.

The procedures in this document, as well as the EPA documents *Guideline on Air Quality Models* (EPA 2005), *New Source Review Workshop Manual* (EPA 1990), and other more issue- specific guidance should typically be followed when conducting the modeling analysis. These documents provide guidance on appropriate model applications. DEQ will work with the applicant to determine acceptable impact assessment procedures where EPA or state policies are not clear cut or involve case-by-case review.

6.1 Modeling Protocol

Applicants are highly advised to contact the DEQ stationary source air quality modeling supervisor at (208) 373-0502 and submit a modeling protocol, as suggested in the modeling checklist (Appendix C), to ensure appropriate models, meteorological data, background concentrations, and procedures are applied. Use of a modeling protocol is a key component of DEQ’s permit streamlining program, which focuses on establishing mutually agreed upon methods and data prior to permit application submittal. This approach substantially reduces DEQ review time and the potential for the application to be determined incomplete or the permit denied because of problems with the modeling analyses.

The content of the modeling protocol is dependent on the type of permit application. A modeling protocol for a new, major source or a major modification at a major facility will be more detailed than one for a new, minor source or a minor modification. A modeling protocol checklist is presented in Appendix D. A description of the general methodology, as well as justification for assumptions and data used, should be included in the modeling protocol.

A modeling protocol, in written form and agreed upon by DEQ, provides the applicant the assurance that their approach and methodology as described will be accepted. However, the approval of a modeling protocol is not meant to imply approval of a completed modeling analysis. The facility should submit as much detailed information as possible in the modeling protocol to increase the likelihood of having the modeling analysis approved. The applicant should prepare the application with the understanding that DEQ will require a higher degree of documentation/justification of data and methods in cases where modeled concentrations are very near regulatory thresholds/standards.

A modeling protocol may be submitted in hard-copy format or may be emailed to the DEQ stationary source modeling coordinator. DEQ will typically provide comments on or approval of the protocol within two weeks from the date the protocol was received.

The following are key issues that should be addressed in the protocol:

- Ambient air boundary. It is the applicant's responsibility to accurately evaluate the ambient air boundary and identify any unique situations affecting the ambient air boundary that may exist at the facility. Such unique situations may include rivers bisecting the facility, easements or public roadways bisecting the facility, railways, lease agreements, and operating a business where the general public is allowed on site. See Section 6.5.
- Justification/documentation of stack parameters. The protocol should thoroughly describe how emissions release parameters (flow rates and stack temperatures) were measured or estimated, if such data are available at that time. A simple indication that parameters were checked will not be accepted as documentation and justification. Calculations of initial dispersion coefficients for volume sources should be provided such that DEQ reviewers can easily and quickly verify the values. See Section 6.4.2.
- Design concentrations. The protocol should clearly state what modeled concentrations will be used to evaluate compliance. For example, the maximum of 6th highest modeled concentrations at each receptor is typically used as the PM10 24-hour design value when modeling a five-year data set. See Section 6.11.1.
- Meteorological data. If meteorological data are not provided by DEQ, the applicant should thoroughly justify selection of the data, demonstrating how the data used are representative for the application site. The protocol should also describe the quality of the data, clearly demonstrating the data are adequate for use in an air impact analysis. See Section 6.8.
- Receptor grid. The receptor grid spacing proposed for the analyses should be thoroughly described. See Section 6.6.
- Background concentrations. Within the protocol, the applicant may either propose appropriate background concentrations or request that DEQ provide reasonably conservative background concentrations. See Section 6.10.
- Unique circumstances or scenarios used in the analyses. Any atypical conditions associated with the site or the project that could affect the results of the air impact analyses, or DEQ's approval

of the project, should be described in the protocol. Protocol approval only assures acceptability that those conditions or issues accurately described in the protocol are acceptable.

6.2 Choosing the Appropriate Models

Air quality models approved by the EPA for regulatory use are required (Idaho Air Rules Section 202.02 and 402.03). The DEQ modeling coordinator should be consulted to discuss or verify the model most appropriate for the release being simulated. Factors to consider when determining the appropriate model include, but are not limited to, type of release (e.g., elevated point or area), downwash, location of ambient air, meteorological conditions (e.g., stagnation), and availability of meteorological data. All modeling must use the current versions of models recommended in the EPA's *Guideline on Air Quality Models* (EPA 2005). Many of these models can be found on the EPA's Support Center for Regulatory Air Models (SCRAM) website (http://www.epa.gov/ttn/scram). Modeling performed with older versions may be rejected. Any modification or alteration of a guideline model must be approved by DEQ and, in most instances, the EPA. Approval of the use of other models is completely at the discretion of DEQ. When alternative models are used, DEQ may require the submittal of additional data (e.g., sensitivity analysis) for verification. The use of proprietary models (those models that are not available free of charge to the public) is generally not allowed for the demonstration of compliance with NAAQS, PSD increment, or TAPs increments. Proprietary graphical user interfaces (GUIs) that use unaltered publicly available regulatory models are not considered proprietary models. Results generated by such GUIs will be accepted provided input and output files are submitted and such files can be readily used as input for the publicly available model without the proprietary GUI.

6.2.1 Readily Available Models

The following is a summary of the most commonly used air quality models:

AERMOD – AERMIC (American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee) was formed to introduce state-of-the-art modeling concepts into EPA's air quality models. AERMIC's focus is on a new platform for regulatory steady-state plume modeling. This platform includes: 1) air turbulence structure, scaling, and concepts; 2) treatment of both surface and elevated sources; and 3) simple and complex terrain. The modeling system has three components: AERMOD - the air dispersion model; AERMET - the meteorological data preprocessor; and AERMAP - the terrain data preprocessor. AERMOD is the replacement model for ISCST3.

AERSCREEN – AERSCREEN is the screening-level model for applications where AERMOD would be appropriate.

SCREEN3 – SCREEN3 is a screening version of the ISCST3 model.

SCREEN3 is not considered an acceptable screening model for AERMOD, which is the model replacing ISCST3. *Analyses performed with SCREEN3 will no longer be accepted by DEQ for permitting purposes in most instances.*

CTSCREEN – (Complex Terrain Screening model) –A screening technique when complex terrain is important. CTSCREEN is a screening version of the CTDMPLUS model. CTSCREEN and CTDMPLUS are the same basic model. The primary difference is that CTSCREEN uses an extensive array of predetermined meteorological conditions where site-specific meteorological data are not available.

AERMOD is considered a more refined model for complex terrain. AERSCREEN incorporates the same terrain algorithms as AERMOD, and may yield more favorable results than CTSCREEN.

ISCST3 – (Industrial Source Complex Model) – Historically, the most commonly used refined Gaussian plume model.

ISCST3 has been replaced as an EPA guideline model by AERMOD. *DEQ will generally no longer accept air quality analyses conducted with ISCST3 for permitting purposes.*

CTDMPLUS – (Complex Terrain Dispersion Model Plus Algorithms for Unstable Situations) – A refined air quality model for use in all atmospheric stabilities with sources located in or near complex topography. Since the model accounts for the three-dimensional nature of plume and terrain interaction, it requires detailed terrain and meteorological data that are representative of the modeling domain.

CALPUFF – A multi-layer, multi-species, non-steady-state, puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on pollutant transport, transformation, and removal. CALPUFF is most commonly used to assess impacts on Class I areas and is applied at distances over 50 kilometers. It includes algorithms for subgrid scale effects (such as terrain impingement), as well as longer range effects (such as pollutant removal due to wet scavenging and dry deposition, chemical transformation, and visibility effects of particulate matter concentrations).

CALPUFF is not an EPA-approved model for near-field impact assessment (within 50 kilometers of a source). Any use of CALPUFF in the near-field must be thoroughly justified and approved specifically by DEQ and often by EPA.

VISCREEN – A screening model to assess visibility impacts on Class I areas. Calculates the potential impact of a plume of specified emissions for specific transport and dispersion conditions.

Screening models, such as SCREEN3 and AERSCREEN, are used to simulate the probable worst-case condition under normal, maximum operating conditions. They are generally simplistic representations, typically taking less computer time and yielding conservative impact predictions. A screening analysis must follow EPA guidance in *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised* (EPA 1992) or any current EPA guidance for AERSCREEN. If a properly conducted screening analysis does not indicate an exceedance of the ambient standards from a proposed construction or modification, then a more refined analysis is not necessary to adequately demonstrate compliance.

6.2.2 Replacement of ISC by AERMOD

AERMOD was promulgated as the replacement model for ISC. During the one-year transitional period, between November 2005 and November 2006, applicants could use either ISCST3 or AERMOD to demonstrate compliance. After that, ISCST3 was no longer a guideline model and analyses conducted with ISCST3 were not typically accepted by DEQ.

There are several modeling scenarios that are problematic when using AERMOD:

1. Hot, buoyant plumes released horizontally or with a rain cap. With ISCST3 the typical approach is to set the exit velocity to 0.01 or 0.001 meters per second (m/sec) to effectively eliminate the plume vertical momentum flux, then increase the exit diameter to a point where the modeled volumetric flow is equal to that of the source. This approach cannot be used for AERMOD if plume downwash is considered because downwash behavior is a function of stack diameter in the PRIME downwash algorithm within AERMOD.

   Modeling with the actual stack diameter and a 0.001 m/sec exit velocity is recommended as a conservative measure. This method effectively eliminates vertical momentum of the plume; however, it also eliminates thermal buoyancy effects. In some instances, hand calculations of plume rise, using those equations in the AERMOD algorithms, may show that thermal buoyancy is overwhelmingly the dominant plume rise mechanism. In such cases, the source may be modeled as an uninterrupted vertical release. Use of this method or other methods should be discussed with DEQ prior to use.

   Methods to accurately model hot horizontal releases and capped vertical releases within AERMOD have been developed for Beta versions of AERMOD. Applicants should contact DEQ as to the availability of AERMOD versions to handle hot horizontal and capped releases.

2. Representative meteorological data are rather limited for many areas within Idaho. More site-specific meteorological and land surface characteristics are needed to run AERMOD than what is used for ISC. Therefore, using meteorological data from a distant station is more of a concern when using AERMOD.

   It is the applicant's responsibility to demonstrate the meteorological data used are representative of meteorological conditions at the application site. Applicants may be required to use specialized methods to demonstrate compliance in cases where available meteorological data are of questionable representativeness. Such methods could involve running additional modeling analyses using multiple meteorological data sets or otherwise providing a demonstration that use of on-site data could not reasonably be expected to give results that exceed applicable regulatory thresholds or standards.

6.3 Pollutants and Sources to be Included in the Impact Analyses

This section discusses what pollutants and sources should be included in modeling analyses submitted in support of applications for permits to construct (PTCs), Tier II operating permits, and FEC permits. Specific emissions sources that are exempt from permitting requirements are not necessarily exempt from a modeling analysis when a PTC or Tier II Operating Permit is required for other sources/reasons. DEQ modeling staff should be consulted before any emissions sources eliminated from the modeling analyses.

DEQ does have a list of activities that may be treated as "trivial" and are not required to be addressed in the permit application. In addition to the trivial activities listed below, Idaho Air Rules Section 317 list activities that are "presumptively insignificant emission units." DEQ has determined that these activities must generally be included in Tier II and PTC applications when facility-wide modeling is required. The list below was generated from an EPA white paper entitled Streamlined Development of Part 70 Permit Applications (EPA 1995).

<u>Activities That May be Treated as "Trivial" (EPA 1995):</u>

1. Combustion emissions from propulsion of mobile sources, except for vessel emissions from outer continental shelf sources.
2. Air-conditioning units used for human comfort that do not have applicable requirements under Title VI of the Clean Air Act.
3. Ventilating units used for human comfort that do not exhaust air pollutants into the ambient air from any manufacturing/industrial or commercial process.
4. Noncommercial food preparation.
5. Consumer use of office equipment and products, not including printers or businesses primarily involved in photographic reproduction.
6. Janitorial services and consumer use of janitorial products.
7. Internal combustion engines used for landscaping purposes.
8. Laundry activities, except for dry cleaning and steam boilers.
9. Bathroom/toilet vent emissions.
10. Emergency (backup) electrical generators at residential locations.
11. Tobacco smoking rooms and areas.
12. Blacksmith forges.
13. Plant maintenance and upkeep activities (e.g., grounds keeping, general repairs, cleaning, painting, welding, plumbing, re-tarring roofs, installing insulation, and paving parking lots) provided these activities are not conducted as part of a manufacturing process, are not related to the source's primary business activity, and do not otherwise trigger a permit modification.[a]
14. Repair or maintenance shop activities not related to the source's primary business activity, not including emissions from surface-coating or degreasing (solvent metal cleaning) activities, and not otherwise triggering a permit modification.
15. Portable electrical generators that can be moved by hand from one location to another.[b]
16. Hand-held equipment for buffing, polishing, cutting, drilling, sawing, grinding, turning or machining wood, metal or plastic.
17. Brazing, soldering and welding equipment, and cutting torches related to manufacturing and construction activities that do not result in emission of hazardous air pollutant metals.[c]
18. Air compressors and pneumatically operated equipment, including hand tools.
19. Batteries and battery charging stations, except at battery manufacturing plants.
20. Storage tanks, vessels, and containers holding or storing liquid substances that will not emit any volatile organic compound or hazardous air pollutant.[d]
21. Storage tanks, reservoirs, and pumping and handling equipment of any size containing soaps, vegetable oil, grease, animal fat, and nonvolatile aqueous salt solutions, provided appropriate lids and covers are utilized.
22. Equipment used to mix package soaps, vegetable oil, grease, animal fat, and nonvolatile aqueous salt solutions, provided appropriate lids and covers are utilized.
23. Drop hammers or hydraulic presses for forging or metalworking.
24. Equipment used exclusively to slaughter animals, but not including other equipment at slaughterhouses, such as rendering cookers, boilers, heating plants, incinerators, and electrical power generating equipment.
25. Vents from continuous emissions monitors and other analyzers.
26. Natural gas pressure-regulator vents, excluding venting at oil and gas production facilities.
27. Hand-held applicator equipment for hot-melt adhesives with no volatile organic compounds in the adhesive formulation.

28. Equipment used for surface coating, painting, dipping, or spraying operations, except those that will emit any volatile organic compound or hazardous air pollutant.
29. Carbon dioxide lasers, used only on metals and other materials that do not emit hazardous air pollutants in the process.
30. Consumer use of paper trimmers/binders.
31. Electric- or steam-heated drying ovens and autoclaves, but not the emissions from the articles or substances being processed in the ovens or autoclaves, or the boilers delivering the steam.
32. Salt baths using nonvolatile salts that do not result in emissions of any regulated air pollutant.
33. Laser trimmers using dust collection to prevent fugitive emissions.
34. Bench-scale, laboratory equipment used for physical or chemical analysis, but not for lab fume hoods or vents.[e]
35. Routine calibration and maintenance of laboratory equipment or other analytical instruments.
36. Equipment used for quality control/assurance or inspection purposes, including sampling equipment used to withdraw materials for analysis.
37. Hydraulic and hydrostatic testing equipment.
38. Environmental chambers not using hazardous air pollutant gasses.
39. Shock chambers.
40. Humidity chambers.
41. Solar simulators.
42. Fugitive emissions related to movement of passenger vehicles, provided the emissions are not counted for applicability purposes and any required fugitive-dust-control plan or its equivalent is submitted.
43. Process-water filtration systems and demineralizers.
44. Demineralized-water tanks and demineralizer vents.
45. Boiler-water treatment operations, not including cooling towers.
46. Oxygen scavenging (de-aeration) of water.
47. Ozone generators.
48. Fire suppression systems.
49. Emergency road flares.
50. Steam vents and safety relief valves.
51. Steam leaks.
52. Steam cleaning operations.
53. Steam sterilizers.

a) Cleaning and painting activities qualify as trivial they are not subject to volatile organic compound or hazardous air pollutant control requirements. Asphalt batch plant owners/operators must still get a permit if otherwise required.

b) “Moved by hand” means the generator can be moved without the assistance of any motorized or non-motorized vehicle, conveyance, or device.

c) Brazing, soldering and welding equipment, and cutting torches that emit hazardous air pollutant metals and are related to manufacturing and construction activities are more appropriate for treatment as insignificant activities instead of trivial activities based on size or production-level thresholds. Brazing, soldering, welding, and cutting torches that emit hazardous air pollutant metals and are directly related to plant maintenance, upkeep, and repair, or maintenance shop activities, are appropriately treated as trivial.

d) Consideration of storage tanks containing petroleum liquids or other volatile organic liquids as a trivial source should be based on size limits such as storage tank capacity and vapor pressure of liquids stored are not appropriate for this list.

e) Many lab fume hoods or vents might qualify for treatment as insignificant (depending on the applicable State Implementation Plan) or can be grouped together for purposes of description.

6.3.1 Permits to Construct

Criteria Pollutants

All increases in emissions of criteria pollutants are generally required to be accounted for in the significant impact analyses for PTC applications. However, the emissions sources and inventory used to evaluate the need for modeling, described in Section 3 of this guideline, may differ from the sources and inventory used for the significant impact analyses. All emissions changes associated with a proposed project are generally used in the significant impact analyses, including emissions reductions associated with sources removed from operation. Also, sources included in the significant impact analyses for minor source permitting may differ from sources included for PSD permitting. For minor source permitting, the significant impact analyses for criteria pollutants generally includes: all emissions increases and decreases associated with the proposed project. For PSD permitting, the net emissions increase, as defined in Idaho Air Rules Section 007, is modeled. The net emissions increase includes all increases and decreases that occurred within the previous five years or since the issuance of any PSD permit to the facility, whichever is a shorter period.

Cumulative impact analyses are required if impacts associated with the significant impact analyses exceed SILs, as described in Sections 5.1.1 and 5.1.2. A cumulative impact analysis involves modeling facility-wide emissions, modeling any co-contributing sources, and adding an appropriate background value to results.

DEQ highly suggests that applicants specify in a modeling protocol those sources to be included and/or excluded in the significant impact analyses with thorough justification and documentation. The following provides general guidance for the significant impact analyses performed for specific minor source scenarios:

- Modification to an existing emissions unit where the release parameters (flow rate, stack gas temperature, etc.) do not change. The emissions increase associated with the modification is modeled. If the existing source is currently permitted, the emissions increase will be calculated as the differences between the current permit limit (or whatever emissions rate was used in previous modeling analyses) and the future proposed limit. If the source is not currently regulated by a permit emissions limit, then current emissions should be based on actual emissions as defined by Idaho Air Rules.
- Modification to an existing emissions unit where the release parameters change as a result of the modification. Existing emissions for permitted and non-permitted sources should be calculated as described for scenario “a;” however, current emissions should be modeled as negative emissions (using the existing release parameters) and future allowable emissions modeled as positive emissions (using the new release parameters).
- Removal of, or emissions reductions from, an existing emissions unit. Emissions reductions from such units should be modeled as negative emissions to account for the net project impacts. Existing permit-allowable emissions rates may be used, or actual emissions (based on two years of operations within the previous ten years) for units not regulated by an existing emissions limit.

- Replacement or relocation of an existing emissions unit. Replaced units should be treated in the same manner as removed units, described in scenario “c.”
- Addition or removal of units exempt from permitting. Units that are exempt from permitting should be included in the significant impact analyses in most instances, unless such units are considered as trivial per Table 9 in Section 6.3 of this guideline. Existing and future emissions should be based on maximum potential emissions unless otherwise directed or approved by DEQ.

TAPs

All TAPs, except those exempted under Idaho Air Rules Section 210.20, with project-total emissions increases above the DEQ TAP ELs (discussed in Section 4.0) must be included in the modeling analysis. The DEQ TAPs checklist, available on the DEQ website, should be used to demonstrate compliance with TAPs.

Fugitive Sources

Fugitive emissions are defined in Idaho Air Rules Section 006 as, “those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.” This definition includes windblown dust from a stockpile. Generally, modeling is required for all fugitive emissions sources determined not to be unquantifiable. Fugitive emissions from vehicle traffic on roads and wind erosion from material storage piles are normally not included in the modeling analyses for minor source applications. However, DEQ may require modeling of these sources in instances where these emissions could substantially contribute to ambient concentrations and a potential exceedance of air quality standards. Process fugitive emissions such as those from material handling operations and equipment leaks should be included in the modeling analyses.

Intermittent Sources

Emissions sources that operate intermittently may be excluded from the SIL analysis and/or cumulative NAAQS analysis, approved by DEQ on a case-by-case basis, to the extent that it can be reasonably concluded that such sources could not measurably affect the compliance determination. If the intermittent sources are engines powering emergency generators or fire suppression water pumps, and operations are less than 100 hours/year for operational testing and maintenance, the sources can be excluded from compliance demonstrations for the 1-hour NO2 NAAQS, unless specifically required at the discretion of the DEQ Director. This guidance is explained in more detail in Appendix A.

Inconsequential Sources

The applicant may determine that some sources are “inconsequential” when estimating the design concentration (i.e., only contribute to a small percentage of the total, maximum, ambient impact for that project) and exclude them from the modeling analysis. If this is the case, the applicant must justify the exclusion of these sources. This justification, which is pollutant and averaging-period specific, must be based on emissions rates and a qualitative discussion of impacts. For example, if an emissions unit operates 24 hours per day but only 500 hours per year, the source may be “inconsequential” for the annual emissions, but not for the 24-hour emissions. The justification should include the following two phases:

1. Compare the emissions and operating conditions of each emissions source to the total emissions that would be modeled. If the uncontrolled emissions are “negligible” compared to the total emissions and are not expected to impact the maximum ambient concentration, the individual

emissions source may be deemed as "inconsequential" and may be excluded from the modeling analysis.

Unless there are a large number of negligible sources that will substantially slow the model run time, it may be easier to include such sources in the analyses rather than provide justification for their exclusion.

2. If more than one emissions source is excluded from the modeling analysis, the total emissions of those sources excluded and the total estimated ambient concentration must be compared to the total modeled emissions and qualitatively evaluated for impacts. This will ensure that all of the excluded sources are still "inconsequential" as a whole.

Non-Attainment Areas

Facilities located in an a non-attainment area for a specified pollutant may be required to model all the emissions for that specified pollutant, even those emissions that are deemed to be inconsequential. This process will be treated on a case-by-case basis. It is recommended that the applicant meet with DEQ staff prior to beginning the modeling analysis to discuss what sources will be included.

6.3.2 Facility-Wide Tier II Operating Permits

All emissions for the entire facility, excluding those listed in Table 9, are required to be included in a facility-wide Tier II application. All criteria pollutant emissions are generally required to be included in the modeling analysis submitted with the Tier II operating permit application. Facility-wide TAPs emissions are not typically required to be included in the modeling analysis for the Tier II application. DEQ reserves the right to request additional information or analysis, including the modeling of other pollutants, under Idaho Air Rules Section 402.04, if there is a concern relative to compliance with Idaho Air Rules Section 161. Modeling of all fugitive emissions may be required if DEQ determines it necessary to protect ambient air quality standards.

As with the PTC application, the applicant may determine that some criteria pollutant sources are "inconsequential" when estimating the design concentration (i.e., only contribute to a small percentage of the total, maximum, ambient impact for that project) and exclude them from the modeling analysis. The applicant should use the process presented above in Section 6.3.1. Facilities located in non-attainment areas for a specified pollutant must contact the DEQ modeling coordinator at (208) 373-0112 prior to submitting the Tier II application. DEQ modeling staff will review the current SIP for the area to determine the appropriate level of analysis. This process will be treated on a case-by-case basis. It is recommended that the applicant meet with DEQ staff prior to beginning the modeling analysis to discuss what sources will be included.

6.3.3 FEC Permits

Permit applications utilizing a facility emissions cap (FEC) must provide sufficient modeling scenarios to reasonably assess maximum impacts of potential source configurations. The modeling requirements for these permits are facility-specific and will vary greatly depending on the operational flexibility desired by the permit applicant.

6.4 Source Information Required

This section discusses the source information that is required for a modeling analysis.

6.4.1 Emission Rates

Tables 8.1 and 8.2 in the *Guideline on Air Quality Models* (EPA 2005) present the emissions information required for air dispersion modeling. The emissions rate used in the modeling analysis must be that associated with maximum design capacity or a federally enforceable permit condition (40 CFR 51, Appendix W, Table 9-2). For a major modification, the emissions rate to be modeled in the significant impact analysis for criteria pollutants is the net emission rate increase, as defined in Idaho Air Rules Section 007. To demonstrate compliance with applicable standards, potential emissions must be used in the modeling analyses rather than future projected actual emissions. For minor modifications, the emissions modeled are the emissions changes associated with the proposed project, as described in Section 6.3.1 of this guideline. Emissions decreases are modeled as negative values in the significant impact analyses. However, in instances where NAAQS compliance may be questionable, DEQ may require facility-wide modeling even though results of the significant impact analysis indicate impacts are below SILs. When a cumulative NAAQS analysis is required, the potential emissions for all sources and, if requested, any co-contributing sources are used in the modeling analyses.

For PTCs, the project-wide emissions rate increase of TAPs is compared to the EL in Idaho Air Rules Section 585 and 586. Any TAP that has a total project emissions increase that exceeds the EL must be modeled.

The maximum emissions rate for each averaging period must be identified. For example, PM2.5 has both a 24-hour and an annual standard. If a source will only operate 7,000 hours per year but can operate for 24 hours in a single 24-hour period, then different emissions rates would be modeled for the 24-hour standard and annual standard.

If any pounds per hour emissions rate used in a modeling analysis differs from that used in the emissions inventory, the application should clearly show how the modeled rate was calculated. For example, a source has a maximum hourly emissions rate of 2.0 pounds per hour and a maximum daily operations rate of 12 hours per day (not restricted to any specific daily schedule). The modeled emissions rate for demonstrating compliance with a 24-hour standard would be 1.0 pounds per hour ((2.0 lb/hr x 12 hr/day) / 24 hr = 1.0 lb/hr).

Modeling intermittent sources in a representative and worst-case manner can present a challenge to the modeler. These sources can be modeled in two ways:

1. The allowable emissions can be modeled for a time period equal to that of the actual source. The emissions event is then selected to reasonably represent worst-case impacts or a series of potential operational scenarios are modeled.
2. The allowable emissions for the event are evenly divided over the pollutant averaging period of interest.

As an example, a mill may have fugitive PM2.5 emissions from periodic loadout of a waste bin. The emissions may occur for one hour, three times per week. Modeling must demonstrate compliance with both the 24-hour and annual standards. It is determined that only one loadout can occur during any 24-hour period. Since there is no specific time when the loadout is likely to occur, 24-hour modeling was conducted by evenly dividing the emissions from one loadout throughout the entire 24-hour period. Annual impacts were modeled by calculating annual allowable emissions, and evenly dividing those emissions among each hour of the year.

If it is known that emissions are most likely to occur during a certain time of the day, it may be appropriate to distribute emissions only over those hours of the day. The applicant should consult with DEQ modeling staff to obtain approval of such methods prior to modeling intermittent sources.

DEQ may allow exclusion of some very infrequent periodic emissions from the modeling analyses. Monthly testing of an emergency generator for 35 minutes could be an example of an infrequent periodic emissions source. Approval of excluding such sources from the modeling analyses will be made by DEQ on a case-by-case basis considering:

- The pollutant of interest and the averaging period of the standard
- Quantity of emissions from the source
- Frequency of the emissions
- Averaging period of standards associated with pollutants emitted
- Number of sources to be excluded
- Distance from source to ambient air receptors
- Nearby sensitive receptors (hospitals, schools, residences)
- Modeled impact of other sources in relation to applicable standards

As indicated in Section 6.3.1. Intermittent Sources, DEQ allows the exclusion of NOx emissions from intermittent testing and maintenance of engines powering emergency generators and fire suppression water pumps for demonstrating compliance with the 1-hour NO2 NAAQS.

6.4.2 Source Parameters

Stack parameters for each point source that are required to be modeled are as follows:

- Stack base elevation (feet or meters)
- Stack height (feet or meters)
- Stack inside diameter (feet or meters) (If the stack is not circular, use equivalent dimensions determined by Area = d2□/4, where d is the stack's inner diameter)
- Stack exit velocity (meters/second) or exit flow rate (actual cubic feet per minute (acfm))
- Stack exit temperature (□F or K)

Source parameters for area sources include the following:

- Source height (meters)
- Easterly dimension (meters)
- Northerly dimension (meters)
- Initial vertical dimension (meters)
- Angle from North (degrees)

Source parameters for volume sources include the following:

- Source height (meters)
- Initial horizontal dimension (meters)
- Initial vertical dimension (meters)

The application must provide detailed documentation and justification of all source parameters used in the analyses, including calculations where appropriate. Applications not providing sufficient documentation/justification of source parameters will be declared incomplete or denied. Stating that parameters were provided by the manufacturer or design engineer is not considered as adequate documentation/justification.

Flow Rates and Stack Gas Temperatures

Maximum flow rates and maximum stack gas temperatures should not typically be used in the modeling analyses unless the source predominantly operates at such a rate. Although maximum emissions are typically associated with maximum flow rates and stack gas temperatures, maximum impacts are often associated with lower emissions rates and lower stack gas flow rates and temperatures. Applicants should either use multiple scenarios of emissions, flow rates, and temperatures, or conservatively use maximum emissions with more typical stack gas flow rates and temperatures.

Submitted modeling analyses should provide detailed documentation and justification of all release parameters used in the analyses. Stack gas temperatures and flow rates substantially affect dispersion, and the application should clearly show how these parameters were calculated or measured. If gas temperatures are based on measurements made at locations other than near the stack exit, the temperature used in the model should be adjusted to derive a temperature appropriate for the stack exit. Stack gas exit velocities exceeding 50 m/sec will generally be viewed as suspect by DEQ reviewers, and greater documentation of values used will be required.

Unrealistic stack parameters submitted in applications are most commonly associated with internal combustion engines, and typically involve overly high exit velocities and stack temperatures. Applicants often use temperature and flow data obtained for the exhaust manifold rather than for the point of release to the atmosphere. Actual flows and temperatures at the release point will be substantially lower after heat loss through the walls of an exhaust pipe and through an exhaust muffler.

Stack Orientation

DEQ also requires the following be included in the application and modeling analysis:

- Orientation of the stack (horizontal or vertical)
- Indication of the presence or absence of a rain cap or other obstruction in the released flow from a stack

Stack orientation information is important because it affects the dispersion characteristics of the pollutants. If either a horizontal stack or rain cap (or other obstruction) is present, it must be accounted for in the modeling analysis, since upward plume momentum is zero because of either the obstruction or the orientation of the stack.

The method recommended by DEQ for modeling horizontal or rain-capped sources, when using the model AERMOD where downwash is not considered, is based on a procedure recommended by EPA (July 9, 1993, memorandum from Joseph A. Tikvart, Source Receptor Analysis Branch, to Ken Eng, Chief, Air Compliance Branch, Region II). The method involves setting the stack velocity to 0.001 meters per second to effectively turn off momentum plume rise. The memo also recommends turning stack tip downwash off for horizontal releases.

The recommended method for modeling point sources of non-buoyant emissions with horizontal release or vertical release with the presence of a rain cap is as follows:

1. Define the emissions source as a point source, entering in the model the actual height of release, stack gas temperature, and the Universal Transverse Mercator (UTM) coordinates.
2. Plumes from horizontal emissions releases or vertical stacks with rain caps experience no momentum induced plume rise. Set the stack gas exit velocity to 0.001 meters per second to effectively prevent the model from accounting for momentum plume rise.

3. Stack tip downwash is not appropriate for horizontally released emissions. If the emissions vent in the horizontal direction, the stack diameter can be set to 0.001 meters to prevent stack tip downwash effects. This step should not be used for sources that vent vertically with a rain cap over the stack, since the rain cap will not prevent stack tip downwash effects. The actual inside stack diameter should be used for rain-capped stacks.
4. Run the model as otherwise required.

By setting the flow velocity and/or stack diameter to 0.001, plume rise from hot, buoyant plumes is inappropriately eliminated. Since the PRIME downwash algorithm within AERMOD is affected by stack diameter, it is not acceptable to artificially increase the diameter by a substantial degree to generate a more accurate mass of hot stack gas emitted.

Non-regulatory versions of AERMOD allow the modeler to identify sources as a horizontal release or rain-capped source, and the model will consider the thermal buoyancy flux in the plume rise calculation while not considering a vertical momentum flux. To use the non- regulatory version, the actual temperature, stack diameter, and flow rate are entered into the model, then the source is identified in the AERMOD input file as a capped or horizontal release. DEQ must approve the use of any non-regulatory options in AERMOD.

Alternate methods may be approved by DEQ on a case-by-case basis if there are unique circumstances. In such cases, DEQ strongly advises that the permit applicant or consultant contact DEQ prior to modeling to discuss the issue, prepare a modeling protocol, and obtain prior approval from DEQ to use the proposed method.

<u>Initial Plume Dimensions for Volume Sources</u>

Initial horizontal plume dimensions for volume sources should be calculated as follows:

- Single volume source:
  $\sigma y0$ = side length of source divided by 4.3
- Line source represented as a series of volume sources (separated or adjacent):
  $\sigma y0$ = side length of source divided by 2.15

Initial vertical plume dimensions for volume sources should be calculated as follows:

- Surface based source:
  $\sigma z0$ = height of source divided by 2.15
- Elevated source on or adjacent to a building:
  $\sigma z0$ = building height divided by 2.15
- Elevated source not on or adjacent to a building:
  $\sigma z0$ = building height divided by 4.3

6.4.3 Scaled Plot Plan

A scaled plot plan showing emissions release locations, nearby buildings, property lines, fence lines, and roads is required (Section 8.1.2(b), *Guideline on Air Quality Models* (EPA 2005). The dimensions of the buildings (height, width, and length) should be noted either on the plot plan or in a table in the report. If building dimensions are listed in a table format, then it should be easy to cross-reference between the plot plan, model input file, and table.

The use of site plot plans generated directly from the modeling files does not meet the scaled plot plan submittal requirement. The submittal should include those scaled plot plans used to generate the modeling files.

6.4.4 Building Downwash Parameters

According to Section 6.2.2 in the *Guideline on Air Quality Models* (EPA 2005), the air quality impacts associated with cavity and wake effects due to the nearby building structures should be determined for any stacks with stack heights less than good engineering practice (GEP). If AERSCREEN is used with the option of entering dimensions of a single building, the building with the greatest corresponding GEP stack height should be analyzed. This may not necessarily be the building closest to the stack. When the EPA's AERMOD model is used and stacks are less than GEP stack height, building profile information is required for use in the modeling. The recommended building profile software is the EPA's *Building Profile Input Program* (BPIP). This program can also be used to determine which building should be used in the screening analysis. BPIP is available on EPA's SCRAM website.

6.4.5 Source, Building, and Receptor Coordinates and Elevations

UTM coordinates are typically used to define locations of emissions points, building corners, and receptor locations. The datum (e.g., NAD27, NAD83, WGS84) must be specified for the coordinates used, and the same datum must be used for all locations specified in the modeling analysis to assure consistency. The same coordinate system should also be used to evaluate elevations for emissions points, buildings, and receptors.

6.5 Ambient Air Boundary

The ambient air boundary must be determined before an ambient air assessment can be completed. The definition of ambient air in Idaho Air Rules Section 006 is, "that portion of the atmosphere, external to buildings, to which the general public has access." The EPA has further stated that "the exemption from ambient air is available only for the atmosphere over land owned or controlled by the source and to which public access is precluded by a fence or other physical barriers" (Costle 1980). Based on these definitions, DEQ has developed the following guidance to be used when determining the ambient air boundary for a facility.

It shall be assumed that the air within the facility boundaries is ambient air unless the facility can demonstrate that public access is precluded. The facility-proposed ambient air boundary must include justification that demonstrates the facility has reasonable control of the area and effectively precludes public access on a routine basis. The following criteria must be satisfied when developing a facility-proposed, ambient-air boundary justification. A justification must accompany the answers.

For the purpose of defining ambient air, the "general public" is considered anyone not directly associated with the facility. In general, if someone present at the site would not be subject to OSHA or other worker exposure regulations, then they are considered as the general public.

1. Facility Control
    - Is general public access precluded by a physical barrier (e.g., fence with a gate)? If "yes," the facility is assumed to be controlled and public access effectively precluded, and the ambient air boundary can be set at the fence line. Proceed to No. 2. If "no," then proceed to No. 1b. Rugged terrain or a water body is not typically considered as a physical barrier.

- Is general public access discouraged by the type of area (e.g., industrial park site away from residential or recreational areas), size of the facility (e.g., the facility is surrounded by a buffer zone that is controlled by the facility), or a remote location away from the proximity of human habitation or activities? Is the facility controlled by reasonable posting of the property with "no trespassing" signs, or reasonable patrol of the property by a security person who routinely asks trespassers to leave? If "yes" to BOTH questions, the facility is assumed to be controlled, with public access effectively precluded, and the ambient air boundary is determined to be at the property boundary. Proceed to No. 2. If "no," to EITHER question, proceed to No. 1c.
- If the facility is not controlled by a physical barrier AND/OR general public access is not discouraged by the type of area, size of the facility, or the remoteness of the facility location, then the ambient air boundary is determined to be inside the property boundary. The actual point at which the ambient air boundary occurs is dependent on several factors, such as the type of operation at the facility (e.g., are employees outside on a regular basis?) and whether employees have a clear view, from the location where the employees normally work, of the entire property (e.g., are trees blocking the sight?). The ambient air boundary is determined to be at a point where employees are not regularly present and where they do not have a clear view of the property. To meet this criteria, a very detailed description of the facility and property must be provided. If a justification cannot be provided, the ambient air boundary is determined to be all air that is external to the buildings. Proceed to No. 2.

2. Facility Business
   Is the general public invited as part of the normal business conducted on the facility site (e.g., the facility includes a commercial establishment or service provider)? If "yes," then the area into which the public is invited is determined to be ambient air. Adjust the ambient air boundary determined in No. 1. If "no," the ambient air boundary determined in No. 1 is not changed. Proceed to No. 3.
3. Right-of-Way Access
   Is the general public allowed on site as a part of a right-of-way easement or a common service road? If "yes," then the right-of-way is determined to be ambient air. Adjust the ambient air boundary determined in No. 1. If "no," the ambient air boundary determined in No. 1 is not changed. Any streams or rivers transecting a facility will be considered as ambient air at all locations between high water levels unless the applicant adequately demonstrates and documents that public access can be legally precluded. Idaho Department of Lands and Fish and Game rules governing public access should be used for such a demonstration.
4. Leased Property
   Does the facility lease a portion of their site to another industry, business, or individual OR does the facility lease property from another entity? For example, if a facility leases part of its property to a farmer for growing crops, that portion leased may be considered as ambient air. These situations are frequently complicated, and DEQ should be consulted regarding any specific case involving leased property as it affects the ambient air boundary.

Any area outside the facility's (or facilities' if they are under common ownership) control will be considered ambient air. This includes other industrial facilities. The employees of other facilities are considered to be general public for the facility in question. Evaluation of the ambient air quality must include all sources within facility control if the source or source modification exceeds the SILs defined in IDAPA 58.01.01.006 (definition of significant contribution).

6.6 Receptor Network

A receptor network establishes locations where the air dispersion model calculates a pollutant concentration. Each location is called a receptor, to represent a receptor that might be exposed to that concentration at that location. Receptors are required to be placed in all areas considered to be ambient air.

Modeling must be conducted using a sufficiently dense receptor grid to reasonably resolve the maximum modeled concentration and confidently demonstrate compliance with standards.

DEQ may determine an application incomplete or may deny a permit if DEQ is not confident the receptor grid spacing used is adequate to confidently demonstrate NAAQS compliance. DEQ may also include additional receptors during verification modeling if it is questionable whether the maximum concentrations have been resolved, and approval will not be granted if results do not comply with applicable standards. Adequacy of the receptor grid can be evaluated by reviewing a plot of modeled design value concentrations and considering the following:

- Maximum modeled concentrations in relation to a trigger value (SILs, NAAQS, or AACs/AACCs)
- Concentrations at receptors immediately adjacent to the maximum modeled concentration
- Terrain features within the modeling domain and areas beyond the domain if maximum modeled concentrations are near the boundary of the domain

6.7 Elevation Data

Terrain elevations for sources and receptors should be used when appropriate (EPA 2005). Where AERMOD is the model used to demonstrate compliance, the applicant should generally use the latest established procedures and guidance provided by EPA (see the SCRAM website on EPA's TTNWeb-Technology Transfer Network (*http://www.epa.gov/ttn/scram*). Prior to 2009, elevations of receptors, sources, and buildings used in the modeling analyses were determined from U.S. Geological Survey (USGS) Digital Elevation Model (DEM) files. AERMAP now supports processing terrain elevations from the National Elevation Dataset (NED) developed by the USGS. Since the DEM files will no longer be updated, NED represents more up-to-date and accurate data, and these should be used in preference to DEM files. These data can be downloaded in a seamless data set in GeoTiff format for use in AERMAP.

A single, consistent source of terrain data should be used to establish elevations for receptors, emissions sources, and site structures. Using different datums within a single modeling analysis can result in critical problems such as sources located beneath ground-level, buildings suspended above ground-level, or facilities located on hillsides rather than valley floors.

6.8 Meteorological Data

The meteorological data used in the modeling analysis should be representative of the meteorological conditions at the particular site of the proposed construction or modification. Section 8.3 in the *Guideline on Air Quality Models* (EPA 2005) states that representativeness of the meteorological data is dependent on the following: (1) the distance from the meteorological monitoring site to the area under consideration; (2) the complexity of the terrain surrounding both the meteorological monitoring site and the area under consideration; (3) the exposure of the meteorological monitoring site; and (4) the period of time during which data are collected.

When using AERMOD, representativeness will also depend on the similarity between the monitoring site and the application site for: 1) surface roughness; 2) land type characteristics that influence parameters such as albedo and Bowen Ratio (vegetative cover and moisture content). Consult with the DEQ air quality modeling coordinator to determine if representative meteorological data are available for the area under consideration. If the only available meteorological data are of questionable representativeness, DEQ may require applicants to perform modeling analyses using multiple meteorological data sets. Alternatively, site-specific data could be acquired by the facility. Site-specific meteorological data are typically only required for PSD applications or when DEQ has concern regarding NAAQS compliance.

The collection of site-specific meteorological data should follow the recommendations provided in *Meteorological Monitoring Guidance for Regulatory Modeling Applications* (EPA 2000), as well as Section 8.3.3 in the *Guideline on Air Quality Models* (EPA 2005). Site-specific meteorological data must be approved prior to use in a modeling analysis. Generally, following EPA recommendations and procedures is determined to be adequate for DEQ approval. To receive approval, the facility must provide DEQ staff with standard operating procedures, the quality assurance plan for operating the meteorological tower, and quality control audit reports that cover the entire year of data. DEQ will review this information and respond with either an approval or denial letter. The facility should either reference or include a copy of the approval letter when meteorological data are used in a modeling analysis. This will help to expedite the review process of the permit application. If DEQ does not approve the data for air modeling purposes, the analyses will not be approved and alternate approaches must be developed.

There are several sources of meteorological data besides on-site collected data. The National Weather Service (NWS) collects data throughout the country. Much of these data are collected at airports. These and other data are available through the National Climatic Data Center (*http://www.ncdc.noaa.gov/oa/ncdc.html*), through EPA's SCRAM website, or possibly through DEQ's modeling coordinator.

As stated in Section 8.3.1.1 in the *Guideline on Air Quality Models* (EPA 2005), the model user should "acquire enough meteorological data to ensure that worst-case meteorological conditions are adequately represented in the model results." Section 8.3.1.2 recommends using five years of NWS data or at least one year of site-specific data. If more than one year of site-specific data are available, then all years, up to five years, should be used (see Section 8.3.1.2(b) in EPA 2005). Site-specific meteorological data must be subjected to DEQ-approved quality assurance procedures.

The following should be considered when generating meteorological data with AERMET:

- Surface characteristics specified for landuse types in AERMET are based on the meteorological measurement site, not the facility application site.
- The EPA program AERSURFACE should be used, following recommendations specified in the user's guide, to define season- and sector-specific surface parameters (albedo, Bowen Ratio, and surface roughness).
- A current aerial photograph of the meteorological measurement site, or a detailed land- use map, should be used to check the accuracy of land-use files used in AERSURFACE.
- Sector-specific values of surface characteristics should be calculated for each season.
- Documentation of the surface characteristics analyses should be submitted with the application. Sufficient detail must be provided such that DEQ staff can regenerate the AERMET output meteorological files.

6.9 Land-Use Classification

Determining if the area surrounding the facility is urban or rural is necessary before a dispersion modeling analysis can be conducted correctly. Two methods of classifying an area as urban or rural are described in Section 7.2.3.c in the *Guideline on Air Quality Models* (EPA 2005). The first is the land-use method. The area is classified according to the current land usage (according to the meteorological land-use typing scheme proposed by Auer [1978]) of its surroundings in a three-kilometer (approximately 1.8-mile) radius centered at the source. If 50 percent or more of the surrounding area is classified as I1, I2, C1, R2, or R3 (using classifications listed in Auer 1978), the source would be considered an urban source. Otherwise, the source would be considered rural. Appendix E provides a summary of the meteorological land-use typing scheme proposed by Auer (1978).

A second method relies on population density. If the population density within a three-kilometer (approximately 1.8-mile) radius, centered at the facility, is greater than 750 people per square kilometer, the urban modeling option for the area can be used. However, the population density method of source classification should not be applied to highly industrialized areas. This is because highly industrialized areas typically have low population densities, but the presence of buildings and areas of asphalt and concrete make the source more urban in nature. The *Guideline on Air Quality Models*, Section 7.2.3.e, states that, of the two methods, the land-use procedure is more definitive (EPA 2005).

6.10 Background Concentrations

Section 8.2 in the *Guideline on Air Quality Models* (EPA 2005) discusses the use of background concentrations in a cumulative NAAQS analysis. Background concentrations of regulated criteria pollutants must be included in cumulative NAAQS analyses for both PSD and non-PSD applications. The modeler is required to contact DEQ prior to performing the modeling analysis to obtain the appropriate, reasonably conservative background concentration(s) for the area and time intervals of concern. A different pollutant-specific concentration is needed for each applicable averaging period.

Background concentrations are developed based on air quality monitoring data collected from the area of the proposed project or from similar areas determined to be reasonably representative. DEQ has developed applicable background concentrations for specific areas and default concentrations for areas where monitoring data are not available. Facilities may propose alternate/refined background concentrations based on their own analyses. Use of an alternate background concentration should be proposed within a modeling protocol submitted to DEQ. An alternate background concentration proposal analysis should include the following:

- Description of monitoring data proposed as representative of the proposed project area. The description should include the statistics of the data set and the quality control/assurance measures conducted for the data if data were not provided by DEQ.
- Description of all emissions sources in the area of the proposed project and sources in the area(s) where claimed representative monitoring data were obtained. This should include both point sources and area/mobile sources, and should also address emissions source density. A discussion should be provided that compares the two areas and supports the use of the monitoring data for the project site.
- A detailed assessment of the meteorology of the project area and the area where monitoring data were obtained. Differences between the areas should be assessed for the effects they may have on pollutant dispersion and concentrations in ambient air.

Air monitoring data for Idaho can be obtained at the following EPA website address: *http://www.epa.gov/air/data/index.html*. In most instances, background concentrations calculated in the following manner will be accepted by DEQ:

- 24-hour PM2.5: The maximum 3-year mean of 98th percentile of 24-hour average concentrations over 1-year periods.
- Annual PM2.5: The maximum 3-year mean of annual averages, using 5 consecutive years of data.
- Short term standards of PM10, SO2, and CO: The maximum 2nd highest monitored value over each year of applicable data.
- 1-hour NO2: The maximum 3-year mean of the 98th percentile of the daily maximum 1-hour average concentrations over 1-year periods.
- 1-hour SO2: The maximum 3-year mean of the 99th percentile of the daily maximum 1-hour average concentrations over 1-year periods.
- Annual Standards of SO2 and NO2: The maximum annual average for the applicable data. The most recent 5-year data set should be used.

Existing emissions from a facility may have a measurable impact to monitored concentrations in some instances. It is the facility's responsibility to assess their contribution to the background concentration. Prior to this assessment, a protocol must be submitted to, and approved by, DEQ. The assessment must then be done in accordance with the DEQ-approved protocol. In such cases, the facility's impact may be subtracted from the monitored value to establish an appropriate background concentration value. The following should be considered in such analyses:

- To evaluate a facility's impact on background monitored values, modeling must be performed using meteorological data collected during the same period when monitoring data were collected.
- Site-specific meteorological data must be used. These data must be highly representative for both the facility site and the monitoring site.
- Actual emissions for the period modeled must be used in the analyses.
- Monitored and modeled values must be paired in time and space; i.e. modeled values subtracted from monitoring results must be those values modeled at the site of the monitor for the averaging period associated with the monitored value.
- One suggested approach would be to start with the highest monitored value and model the facility's impact on that value. If the result is lower than the next-highest monitored value, this process should be repeated for that monitored value. This process is repeated until the highest adjusted value is greater than the next unadjusted value. The highest adjusted value is used for the background concentration.

Use of other methods to calculate a background concentration will be evaluated on a case-by- case basis. Proposals for such methods should be thoroughly described in the protocol.

6.11 Evaluation of Compliance with Standards

6.11.1 Approval Criteria

The applicant must demonstrate compliance with all other applicable impact limits in addition to demonstrating compliance with NAAQS. For PSD applications, these include impact limits for Class I areas within 300 kilometers, non-attainment area impact limits (when in or potentially significantly impacting a non-attainment area), and TAPs increment standards in Idaho Air Rules Sections 585 and

586 (when emitting TAPs above DEQ ELs). Federal land managers have the responsibility to protect the natural and cultural resources of Class I areas from adverse impacts of air pollution. Refer to the Federal Land Managers Air Quality Related Values Workgroup (FLAG) Phase I Report- Revised (USFS et al 2010). In some cases, deposition of airborne pollutants (e.g., radionuclides or fluorides, for example) or human risk pathways associated with deposition of airborne emissions may be subject to regulatory impact limits.

The highest modeled ambient concentration must be used for comparison against the SILs for all applicable criteria pollutants. A multi-year average, consistent with the years of meteorological data modeled, of the maximum modeled concentration of each year modeled can be used for the probabilistic standards, including 24-hour PM2.5, annual PM2.5, 1-hour NO2, and 1-hour SO2.

The following design concentrations must be used when demonstrating compliance with the cumulative NAAQS:

- CO
  - 1-hour averaging period – maximum of second highest ambient concentrations at each receptor
  - 8-hour averaging period – maximum of second highest ambient concentrations at each receptor
- NO2
  - 1-hour averaging period – maximum of 5-year averages (at each modeled receptor) of the 98th percentile of the annual distribution (equal to the 8th high) of maximum daily 1-hour ambient concentrations
  - Annual averaging period – maximum of ambient concentrations at each receptor
- SO2
  - 1-hour averaging period – maximum of 5-year averages (at each modeled receptor) of the 99th percentile of the annual distribution (equal to the 4th high) of maximum daily 1-hour ambient concentrations
  - 3-hour averaging period – maximum of second highest ambient concentrations at each receptor
  - 24-hour averaging period – maximum of second highest ambient concentrations at each receptor
  - Annual averaging period – maximum of ambient concentrations at each receptor
- PM10
  - 24-hour averaging period – “the projected 24-hour average concentrations will not exceed the 24-hour NAAQS more than once per year on average” (EPA 2005). The design concentration is dependent on the number of meteorological data years used in the analysis. For example, if five years of NWS data were used, then the design concentration would be the sixth highest 24-hour ambient concentration that occurred at each receptor over that five-year period.
- PM2.5
  - 24-hour averaging period – maximum of multi-year average of annual maximum 24- hour ambient concentrations at each receptor. Using the multi-year average of the 98th percentile of the annual distribution (equal to the 8th high) of 24-hour concentrations for both the modeled design value and background is not adequately conservative because background concentrations are frequently the controlling factor for PM2.5.
  - Annual Averaging Period - maximum of multi-year average of annual ambient concentrations at each receptor.

- Pb
  - Quarterly averaging period – maximum of ambient concentrations at each receptor
  - 3-month rolling average – maximum of ambient concentrations at each receptor

If meteorological data used in the analyses are of questionable representativeness, DEQ may require a more stringent design value. DEQ may also require analyses using multiple meteorological data sets to compensate somewhat for increased uncertainty.

The following design concentrations must be used when demonstrating compliance with TAPs requirements:

- Noncarcinogens – 24-hour averaging period – maximum of ambient concentrations at each receptor
- Carcinogens – total averaging period (1-5 years depending on meteorological data availability) – maximum of ambient concentrations at each receptor

6.11.2 Adequacy of Analyses Results

The submitted analyses must demonstrate to the satisfaction of DEQ that applicable emissions do not cause or significantly contribute to a violation of any air quality standard, as per Idaho Air Rules Section 203 for PTCs and Idaho Air Rules Section 403 for Tier II operating permits. Approvability of the submitted analyses will depend on the results of the analyses as well as the representativeness and quality of input data and parameters used. DEQ recognizes the uncertainty in typical dispersion modeling analyses and the variability and uncertainty associated with input parameters such as background concentrations, emission quantities, operational characteristics, etc. These uncertainties will be considered in DEQ's evaluation and determination of acceptability.

DEQ will evaluate model inputs and parameters more carefully as modeling results more closely approach applicable standards. Modeled concentrations within about 90 percent of the standard will be more closely reviewed by DEQ. At these concentrations, approval will be based on a "weight of evidence" type approach, considering the model results, input data/parameters, potentially exposed public, any monitoring requirements specified in the proposed permit, and operational variability. DEQ will not approve any modeling results that do not show compliance with applicable standards. The following provides discussion on how DEQ will evaluate compliance in situations where modeled concentrations are very near applicable standards:

- Modeled Concentrations: Results within about 90 percent of the air quality standard will generally trigger DEQ to more carefully evaluate the analyses. In some instances, the analysis may not adequately demonstrate compliance even though modeled concentrations are below a standard.
- Emissions Estimates: Estimates of emissions can be a substantial source of uncertainty and/or variability. It is important to evaluate both uncertainty in the estimate and variability, and to distinguish between them. Where estimates of maximum emissions are highly uncertain and the estimate is not necessarily conservative, DEQ may consider modeling results slightly below the standard as not adequately demonstrating compliance. Alternatively, if emissions are highly variable and the allowable emission rate is set at the maximum, DEQ will consider the likelihood of high emissions occurring concurrently with conditions of poor dispersion.
- Representativeness of Meteorological Data: Using meteorological data from a distant location where the representativeness is questionable will add to the uncertainty of the modeling analyses. Applicants may be requested by DEQ to provide a more detailed assessment of the area's meteorology and qualitative comparisons to data used in the analyses. Such assessments

should be performed by meteorologists or those having considerable knowledge in surface meteorology. In some instances, DEQ may request an applicant to install and operate a meteorological station to resolve concerns with data representativeness. In cases where meteorological data used in the analyses are of questionable representativeness, DEQ may require the use of multiple meteorological data sets in the analyses.

- Background Concentrations: Background concentrations are often a very large source of uncertainty and variability, especially for 1-hour NO2, PM10, and PM2.5, where background concentrations can be a considerable fraction of the standard. When modeled 1-hour NO2, PM10 and PM2.5 concentrations are very near the standard, applicants should review and compare the meteorological conditions associated with the modeled result and the background concentration.
- Modeled Emissions Release Parameters: Parameters characterizing the release of emissions (stack temperature, flow rate, initial plume dimensions for volume sources, etc.) greatly impact the modeling results. The conservatism of these parameters will be considered by DEQ during the review.
- Permit Requirements: As modeled concentrations approach applicable standards, DEQ may require more extensive emissions monitoring, source testing, and possibly ambient air monitoring.
- Areas with High Concentration Impacts: DEQ will consider the land use of areas where models project high concentrations. DEQ will require a higher degree of certainty for areas where there is a high potential for exposures to the public, such as actual residences, businesses, parks, etc. However, it is important to consider that dispersion models are reasonably accurate at predicting the magnitude of maximum concentrations but often perform poorly at predicting the location or time of maximum concentrations.

6.12 Air Quality Modeling Report

The applicant must supply an air quality modeling report that presents the case as to how the modeling results demonstrate compliance with all applicable air quality standards. The level of detail of the report will depend on the complexity of the proposed facility and the permitting project.

Each submitted application must be a complete package in itself. Referencing previously submitted materials, such as those submitted in an earlier application, will not generally be considered as meeting the stated requirements to provide documentation/justification of air quality analyses and data used as inputs for those analyses.

Below is an example annotated outline of an air quality modeling report. The report should thoroughly describe all aspects of the air impact analyses performed. Specific sections of this guideline should be consulted to evaluate the details needed for the modeling report regarding certain aspects of the analyses.

I Purpose

- State the purpose of the air quality modeling analyses (i.e., demonstrating compliance for a permit to construct or a Tier II operating permit).
- Provide a detailed description of regulatory requirements as they relate to modeling, citing specific applicable regulations.

II Model Description/Justification

- Discuss what model was chosen and justify why it is the appropriate model for the situation. This discussion may be very brief if the applicant is proposing to use AERMOD for near-field impacts.

III Emissions and Source Data

- Present tables showing the current (either actual or permit allowable) emission rates, future allowable emissions rates (maximum for each applicable averaging period), and the requested emission increase (future allowable minus actual or current allowable).
- If cumulative NAAQS impact analyses are required, the applicant must thoroughly document all emissions used in the model, even when such sources are not affected by the particular proposed project. Emissions calculations, source test data, and/or other information justifying the value used should be provided for all sources unless those emissions are based on a specific emissions limit presented in an issued permit.
- Provide justification for those sources and/or pollutants determined to be “inconsequential” (if applicable).
- Provide stack parameters (emissions rates, stack height, stack elevation, stack diameter, stack gas exit velocity, and stack gas exit temperature) for each modeled emissions point. Values for stack parameters should be justified and well documented, indicating whether values are estimated or measured.
- Provide a facility plot plan to scale showing the fence line, ambient air boundary, emission sources at the facility, and buildings. Include the height, width, and base elevation of each building at the facility.
- Provide UTM coordinates of all emissions points, and list the datum used.

IV Ambient air boundary

- Thoroughly describe how the public are precluded from accessing all areas excluded from the receptor network, describing any complicating ambient air issues such as rivers bisecting the facility, leasing agreements, retail sales operations at the site, right of ways, etc.

V Receptor Network

- Describe the receptor network used. Include the distance between receptors for the fine and coarse grids. Justify any deviation from minimum recommendations in EPA or state guidelines, and provide a demonstration that the receptor grid allows for resolution of the maximum modeled concentration.

VI Elevation Data

- Describe any elevation data used and the source of the information, including the datum for the coordinates used. If necessary, include a USGS 7.5-minute map showing the location of the facility. A justification must be provided if elevation data are not used.

VII Meteorological Data

- Describe the source of the meteorological data and present a representative analysis according to Section 6.8. Electronic copies of the files must be included with the modeling report if meteorological data were not provided in model-ready format to the applicant from DEQ. If site-specific data are used, provide documentation that DEQ has reviewed and approved the data.
- If the applicant has generated AERMOD input meteorological files by running AERMET, rather than using AERMOD input files provided by DEQ, supporting AERMET documentation must be submitted with the application. A detailed report on the processing of meteorological data

should be submitted, including a report on running AERSURFACE to evaluate surface characteristics and a detailed report on data collection and quality for any on-site data processed. Copies of the raw meteorological data must also be submitted to DEQ.

VIII Land-Use Classification

- State the land-use classification for the area surrounding the source and provide the justification.

IX Background Concentrations

- State whether background concentrations were used and identify the source of the information.
- If DEQ default background concentrations were not used, the report must thoroughly describe and document how background concentrations were determined.

X Evaluation of Compliance with Standards

- Include tables summarizing the air quality model output (example tables are shown in Appendix F).

XI Electronic Copies of the Modeling Files

- Provide modeling input/output files (including BPIP and meteorological data, and intermediate files generated by AERMET, AERMAP, and AERMOD) on compact disk or other means.

7 DEQ Review of Modeling Analyses

DEQ dispersion modeling staff will review the submitted air quality analyses prior to approval and issuance of the permit. Review of the analyses will occur in two phases: 1) completeness review; 2) technical review of submitted analyses. The completeness review will focus on evaluating whether the required analyses were performed and the primary components of the air quality analyses were submitted with the application. The technical review will evaluate whether the data and methods used in the analyses are accurate and appropriate for the project.

Several methods and approaches can be used by the applicant to ensure the submitted modeling analyses are approved by DEQ or, if there are problems with the analyses, such problems are identified early in the completeness review and will minimize delays to the project:

1. Submit a modeling analyses protocol prior to conducting the analyses. The protocol, as described in Section 6.1, should provide details on the proposed methods and data to the greatest degree possible.
2. Provide a detailed and well-organized modeling analyses report, as described in Section 6.12. This will allow DEQ staff to quickly assess the appropriateness and technical accuracy of the analyses. If a modeling protocol was submitted to DEQ prior to the application, a copy of the protocol and DEQ’s protocol approval notification should be included with the application.
3. Provide clear justification for methods and data used, and provide supporting documentation. Calculations should be provided such that the DEQ reviewer can easily verify the calculated values.
4. Ensure that emissions sources are named consistently between the emissions inventory used for the permit application forms and the modeling analyses.

Conduct quality assurance/control measures to minimize error in the submitted analyses. The following are some measures that will help minimize or identify errors in the analyses:

- Print or view a three-dimensional representation of the sources, building, receptors, and the ambient air boundary. This will identify any errors in UTM coordinates and elevations.
- Check that all sources included in the application are included in the modeling analyses. If some sources are not included, a detailed justification should be provided. If facility-wide modeling is needed for a cumulative impact analysis, the emissions inventory of other sources, not directly addressed by the current permitting action, should be thoroughly documented.
- Emissions rates used in the modeling analyses should be identical to those listed in the permit application forms and the emissions calculation section of the application. Any differences between emissions rates should be thoroughly documented and all calculation steps should be shown. This will allow DEQ reviewers to quickly evaluate how emissions rates were calculated.

8 Summary

This document provides guidance for performing an ambient air assessment, for permitting purposes, in the state of Idaho. This document should be used in conjunction with the EPA's *Guideline on Air Quality Models* (EPA 2005) and *New Source Review Workshop Manual* (EPA 1990), and other applicable guidance materials. Following the guidance in this document, as well as EPA guidance, will help expedite DEQ's review of the application.

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EPA's SCRAM website: http://www.epa.gov/scram001/index.htm

IDAPA 58.01.01, et seq. *Rules for the Control of Air Pollution in Idaho*

Idaho Department of Environmental Quality Policy Memorandum, *Policy on NAAQS Compliance Demonstration Requirements*, July 11, 2014.

Appendix A. Guidance for 1-Hour NO_2 Modeling of Intermittent Sources

DEQ Guidance for Minor New Source Review Modeling of 1-Hour NO_2 from Intermittent Testing of Emergency Engines

State of Idaho
Department of Environmental Quality

September 2013

Certain industrial facilities have internal combustion (IC) engines that are used only to power emergency generators or fire-suppression pumps. These engines only operate for periodic testing and during an actual emergency. As such, these sources with intermittent emissions are difficult to model in a way that accounts for impacts in a reasonably accurate but conservative manner. As a result, Tyler Fox, leader of Environmental Protection Agency's (EPA) Air Quality Modeling Group, developed a memorandum entitled "Additional Clarification Regarding Application of Appendix W Modeling Guideline for the 1-hour NO_2 National Ambient Air Quality Standard, dated March 1, 2011. The memo provides states with the flexibility to exclude certain types of sources with intermittent emissions from Appendix W modeling.

Upon a review of other states' application of the Tyler Fox memo, comments from the public and Idaho industry, an internal review of Idaho sources, NO_2 background levels, and various sample model runs; DEQ has determined that Nitrogen Oxides (NO_x) emissions from the intermittent operational testing of engines powering emergency generators or fire-suppression water pumps may be excluded from the project-specific significant impact level (SIL) analysis and the cumulative NAAQS analysis for 1-hour NO_2, providing the annual hours of operation from testing and maintenance are less than or equal to 100 hours per engine.

This determination is applicable to minor source air permitting projects and is not limited to any specific number of engines present at a facility. The Director may require deviation from this guidance if deemed appropriate to assure compliance with 1-hour NO_2 NAAQS and IDAPA 58.01.01.203 or 01.403. DEQ will determine how emergency engines are included in permits for major sources, specifically those applicable to the Prevention of Significant Deterioration (PSD) program, on a case-by-case basis.

This guidance does not have the force and effect of a rule and is not intended to supersede statutory or regulatory requirements or recommendations of the state of Idaho or EPA. This guidance may be altered upon new or revised guidance from EPA, development of new methods to appropriately handle such emissions, or new information gained from technical analyses.

Contact the DEQ stationary source air modeling coordinator at (208) 373-0112 for any questions or additional information regarding data and methods for assessing air quality impacts from intermittently operated sources.

Appendix B. Class I Areas

Class I Areas

This appendix shows Class I areas in and near Idaho. The areas represent situations where air quality impact limits are stricter than the NAAQS. The information in this appendix is current as of the date of this document. Please check with DEQ to verify if it is still current.

Area Classifications

The Class I, II, and III areas are defined below (shown in Figure 1).

1. Class I - National park, recreation, and wilderness areas that were already established when the 1977 Clean Air Act was passed, and other designated parts of the country that now benefit from high quality air and where a high priority has been established for the maintenance of pristine conditions. Additional degradation of the air is severely restricted.
2. Class II - Areas that need reasonably or moderately good air quality protection. This is presently the class designation of most areas in the United States. Increments of deterioration have been stipulated that will generally accommodate most proposed development projects.
3. Class III - Areas that can, at the discretion of the states, be designated as allowing for larger increments of air quality degradation and therefore greater growth and development potential. No Class III areas have been designated in Idaho.

The Class I areas in Idaho include the following: Hells Canyon, Sawtooth, and Selway- Bitterroot wilderness areas, Craters of the Moon National Monument, and Yellowstone National Park.

Class I areas near Idaho's borders include the following: Spokane Indian Reservation, Washington; Hells Canyon and Eagle Cap Wilderness areas, Oregon; Cabinet Mountain and Anaconda-Pintler Wilderness areas, Red Rock Lakes, and Flathead Indian Reservation, Montana; Yellowstone National Park, Montana and Wyoming; Teton National Park, Wyoming; and Jarbidge Wilderness, Nevada.

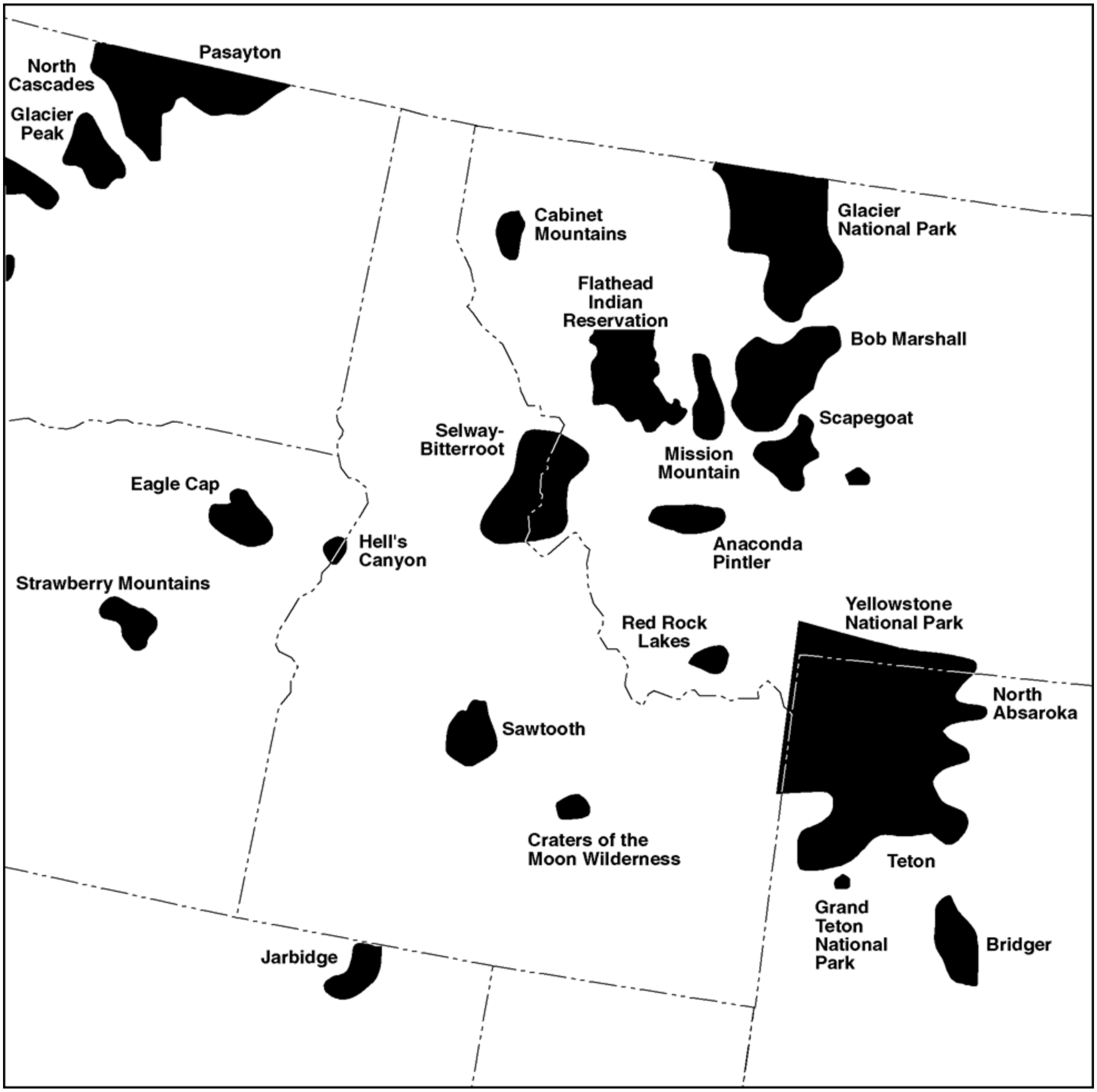

Figure A-1. Class I areas in and near Idaho.

Appendix C. Idaho DEQ Air Dispersion Modeling Checklist

Idaho DEQ Stationary Source Air Dispersion Modeling Checklist

- ☐ Reviewed the Idaho Air Quality Modeling Guideline and have determined the appropriate methods and data for use in this permitting action, contacting DEQ as needed to provide clarification.
- ☐ A modeling applicability analysis was performed for all criteria pollutants emitted by the new facility or modification, and modeling was performed for those pollutants having a total increase in emissions exceeding DEQ modeling thresholds.
- ☐ A TAPs modeling applicability analysis was performed for all TAPs emissions increases associated with the project, and TAPs modeling was performed for those TAPs having a project total emissions rate exceeding the emissions screening levels.
- ☐ Provided a description of the ambient air boundary and demonstrated how public access will be precluded from all areas excluded from ambient air.
- ☐ The receptor grid used meets minimal requirements specified by DEQ AND is adequate to reasonably resolve the maximum modeled concentration and confidently demonstrate compliance with applicable standards.
- ☐ The modeling domain used is sufficiently large to resolve the maximum impacts, accounting for impacts on distant elevated terrain.
- ☐ A scaled site plot plan was included in the application, showing emissions sources, buildings, and the ambient air boundary.
- ☐ Thoroughly documented all release parameters used in the model and provided justification for their use.
- ☐ Emissions rates provided in the emissions inventory section of the application are identical to those used in the modeling analyses or, if emissions rates are not identical, thorough justification of modeled rates has been provided.
- ☐ A cumulative NAAQS impact analysis was performed for all criteria pollutants for which modeled impacts from the significant impact analysis exceeded SILs. The cumulative NAAQS impact analysis included facility-wide emissions, emissions from any co-contributing sources, and a DEQ approved background concentration. Documentation of all emissions rates and release parameters used in the cumulative NAAQS impact analyses are provided in the application.
- ☐ Included all input and output modeling files for all pollutants and averaging periods.
- ☐ If a modeling protocol was prepared and submitted to DEQ prior to performing the air impact analyses, the protocol and DEQ’s protocol approval notice is included with the application.

Appendix D. Modeling Protocol Checklists

Modeling Protocol Checklist for New Minor Sources or Minor Modifications

The following should be thoroughly addressed in a modeling protocol submitted to DEQ:
Introduction and Purpose

- General overview, facility description, description of area where facility is located.
- Project overview.
- Goals of the air quality impact analysis (i.e., demonstrate compliance for a PTC for a modification, PTC for a new facility, or a Tier II operating permit).
- Applicable regulations and requirements.
- Pollutants of concern.

Emissions and Source Data

- Description of facility processes and emissions controls affected by the permitting action.
- List of emissions points that will be included in the modeling analyses. Present a table showing current actual/allowable and future allowable emission rates (using pounds per hour rates for all applicable averaging periods) and the requested emissions increase (future allowable minus current actual or allowable).
- Good engineering practice (GEP) stack-height analysis for any stacks approaching GEP height.
- Graphic showing the facility layout: location of sources, buildings, emissions points, and fence lines.
- Description of methods used to calculate or otherwise determine source parameters (emissions rates, UTM coordinates, stack height, stack elevation, stack diameter, stack- gas exit velocity, and stack-gas exit temperature) for each source included in the modeling analyses.
- Methodology for including area and volume sources in the modeling analysis, including justification and calculations of initial dispersion coefficients and release heights.
- Methodology for including/excluding sources from the modeling analyses.

Air Quality Modeling Methodology

- Description of model selection and justification. This may be minimal in cases where the regulatory guideline model is used (AERMOD in most cases).
- Description of model setup and application
  - Model options (i.e., regulatory default). Describe and provide justification for any non-default settings.
  - Averaging periods used in the analyses and how emissions rates were calculated for specific averaging periods.
  - Land-use analysis in all cases where “urban” is used and in cases where land use is not obviously “rural.”
  - Methods used to account for building downwash in the analyses.
  - Treatment of any chemical transformations (e.g., NO to NO2) accounted for in the analyses.
  - Any other unique methods or data used.Description of how elevations of sources, buildings, and receptors were determined.
- Receptor network
  - Description of receptor grids – include methodology for ensuring the maximum concentration will be estimated
  - Discussion/justification of ambient air boundary, including a description of how the general public will be excluded from areas not considered ambient air.

- Meteorological data
  - Selection of meteorological databases – justification of appropriateness of meteorological data to area of interest
  - Meteorological data processing
  - Meteorological data analysis (e.g., wind rose)
- Background concentrations

Applicable Regulatory Limits

- Methodology for evaluation of compliance with standards (i.e., determination of design concentration)
- Significant Impact analysis
  - Comparison to SILs
  - TAPs analysis
- Cumulative NAAQS impact analysis
  - NAAQS analysis
- Presentation of results – state how the results of the modeling analysis will be displayed (i.e., list what information will be included)

Appendix E. Land-Use Classification Procedure

Land-Use Classification Procedure

See Section 8.2.8.b of *Guideline on Air Quality Models* (EPA 2001) for additional information.

1. Determine a circular area centered on the source with a radius of three kilometers.
2. Classify the land use within this area using the meteorological land-use typing scheme presented in Table D-1.
3. If land-use types I1, I2, C1, R2, and R3 account for 50 percent or more of the area, use urban dispersion coefficients; otherwise, use rural dispersion coefficients.

Table D-1. Identification and Classification of Land-Use Types (Auer 1978)

Type	Use	Structures	Vegetation
I1	Heavy Industrial	Major chemical, steel, and fabrication industries; generally 3-5 story buildings, flat roofs	Grass and tree growth extremely rare; <5% vegetation
I2	Light-moderate Industrial	Rail yards, truck depots, warehouses, industrial parks, minor fabrications; generally 1-3 story buildings, flat roofs	Very limited grass, trees almost totally absent; <5% vegetation
C1	Commercial	Office and apartment buildings, hotels; >10 story heights, flat roofs	Limited grass and trees; <15% vegetation
R1	Common residential	Single family dwellings with normal easements; generally one story, pitched roof structures; frequent driveways	Abundant grass lawns and light-moderately wooded; >70% vegetation
R2	Compact residential	Single, some multiple, family dwellings with close spacing; generally <2 story, pitched roof structures; garages (via alley), no driveways	Limited lawn size and shade trees; <30% vegetation
R3	Compact residential	Old multi-family dwellings with close (<2m) lateral separation; generally 2 story, flat roof structures; garages (via alley) and ash pits, no driveways	Limited lawn size, old established shade trees; <35% vegetation
R4	Estate residential	Expansive family dwellings on multi-acre tracts	Abundant grass lawns and lightly wooded; >80% vegetation
A1	Metropolitan natural	Major municipal, state, or federal parks, golf courses, cemeteries, campuses; occasionally single story structures	Nearly total grass and lightly wooded; >95% vegetation
A2	Agricultural natural		Local crops (e.g., corn, soybeans); >95% vegetation
A3	Undeveloped	Uncultivated; wasteland	Mostly wild grasses and weeds, lightly wooded; >90% vegetation
A4	Undeveloped rural		Heavily wooded; >95% vegetation
A5	Water surfaces	Rivers, Lakes	Not applicable

Appendix F. Example Tables for Air Quality Modeling Report

Example Tables for Air Quality Modeling Reports

This appendix contains examples of tables that are useful in presenting information in modeling reports.

Table E-1. Example Stack Parameters Table

Parameter[a]	Generator Stack	Boiler Stack
Computer Model Identifier (Alias)		
Emissions Rate (lb/hr)		
Stack Height (ft)		
Stack Diameter (ft)		
Exit Temperature (°F)		
Exit Flow Rate (acfm)		

a) Provide thorough justification/documentation of values used in the model, including calculations used to generate values.

Table E-2. Example Significant Impacts Summary ($PM_{2.5}$)

Year	5-Year Mean of Highest Annual Concentration (μg/m^3)	Radius of Significant Annual Impact (m)	5-Year Mean of Highest 24-hour Concentration (μg/m^3)	Radius of Significant 24-hour Impact (m)
1987-1991				
Significant Impact Level	0.3	Not applicable	1.2	Not applicable

Table E-3. Example Maximum Impacts for Cumulative NAAQS Analysis (NO_2 impacts, 1-hour averaging period)

Years Modeled	Multi-Year Mean of 8th Highest Daily Maximum 1-Hour Concentration (μg/m^3)	Receptor Location		
		East (m)	North (m)	Elevation (m)

Table E-4. Example Maximum Impacts for Toxic Air Pollutants Analysis (Carcinogens)

TAPs	Period Average (5-year) Concentration (μg/m^3)	Receptor Location		
		East (m)	North (m)	Elevation (m)

Table E-5. Example Maximum Impacts for Toxic Air Pollutants Analysis (Noncarcinogens)

TAPs	Highest 24-hour Concentration (μg/m^3)	Receptor Location		
		East (m)	North (m)	Elevation (m)

Table E-6. Example NAAQS and Toxic Air Pollutants Impact Analysis Summary

Pollutant	Averaging Period	Total Ambient Impact (Baseline Plus Modification and Co-Contributing Sources) (μg/m^3)	Background Conc. (μg/m^3)	Total NAAQS Conc. (μg/m^3)	NAAQS (μg/m^3)
CO	1-hour				40,000
CO	8-hour				10,000
NO_2	1-hour				188
NO_2	Annual				100
SO_2	1-hour				196
SO_2	3-hour				1,300
SO_2	24-hour				365
SO_2	Annual				80
$PM_{2.5}$	24-hour				35
$PM_{2.5}$	Annual				12
PM_{10}	24-hour				150